ENERGY SAVINGS OPPORTUNITY SURVEY (ESOS)

OF
SCHOFIELD BARRACKS
FAMILY HOUSING
AREAS
A, D, E, F, I, J, K-1

U.S. ARMY CONTRACT NO. DACA83-89-D-0073 FINAL SUBMITTAL

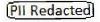
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PREPARED BY:

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SEPTEMBER 9, 1992



CESAM-EN-CM 12/03/92

MEMO FOR RECORD:

SUBJECT: Energy Savings Opportunity Study, Schofield Barracks, HI

This study is an example of a pitfall that should be avoided in the future. The results of the study are acceptable; the only problem encountered with the AE was that they were late with the final submittal. However, the pitfall is that a large effort was expended to investigate very limited potential savings. This study was limited to the family housing area at Schofield Barracks, Hawaii. The only energy source for the quarters is electricity; and they are neither heated nor air conditioned. This really leaves very few possibilities for energy conservation. The ones that readily come to mind are lighting improvements and domestic hot water; and the results of the report confirm this. Although the entire list of standard ECOs was included in the scope of work, the only two that resulted in recommendations were replacing incandescent fixtures with fluorescent fixtures and repairing existing domestic hot water heat pumps. Most of the ECOs on the list were not investigated because they were not applicable. So we spent \$68,000 and got a 6-inch thick report for two recommended projects with projected annual savings of \$115,000. This represents a savings, but we really spent more than we had to.

Could we have avoided this pitfall? Probably. Solicit input from local people, ie, DEH engineers and shop personnel, occupants, operations personnel, etc; they have intimate knowledge about the facilities and may have ideas for energy conservation opportunities. Cut the fat out of the scope of work; focus on the most likely ECOs. This takes extra effort in preparation of the scope of work, but it pays off by reducing the AE's effort and our cost.

Anthony W. Battaglia

EEAP TCX

DEPARTMENT OF THE ARMY

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VOLUME 2. ENERGY SURVEY DATA

APPENDIX E ENERGY SURVEY DATA

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I. <u>Introduction/Background</u>:

This study provides an energy survey of the family housing quarters in Areas A, D, E, F, I, J, & K-l of Schofield Barracks, and evaluates all potential economic conservation opportunities (ECO's). The scope of work for this project is included in Appendix C-l and is summarized as follows:

- 1) Review for general information the previously completed Energy
 Engineering Analysis Program (EEAP) study and any other energy
 studies which were performed at this installation.
- 2) Reevaluate selected projects and energy conservation opportunities

 (ECO's) from previous studies to determine their economic

 feasibility based on revised criteria, current site conditions and
 technical applicability.
- 3) Evaluate selected ECO's to determine their energy savings potential and economic feasibility.
- 4) Perform a limited site survey of selected buildings or areas to insure that any methods of energy conservation which are practical and have not been evaluated in any energy study have been considered and the results documented.
- 5) Provide complete programming or implementation documentation for all recommended ECO's.
- 6) Prepare a comprehensive report to document the work performed, results and recommendations.

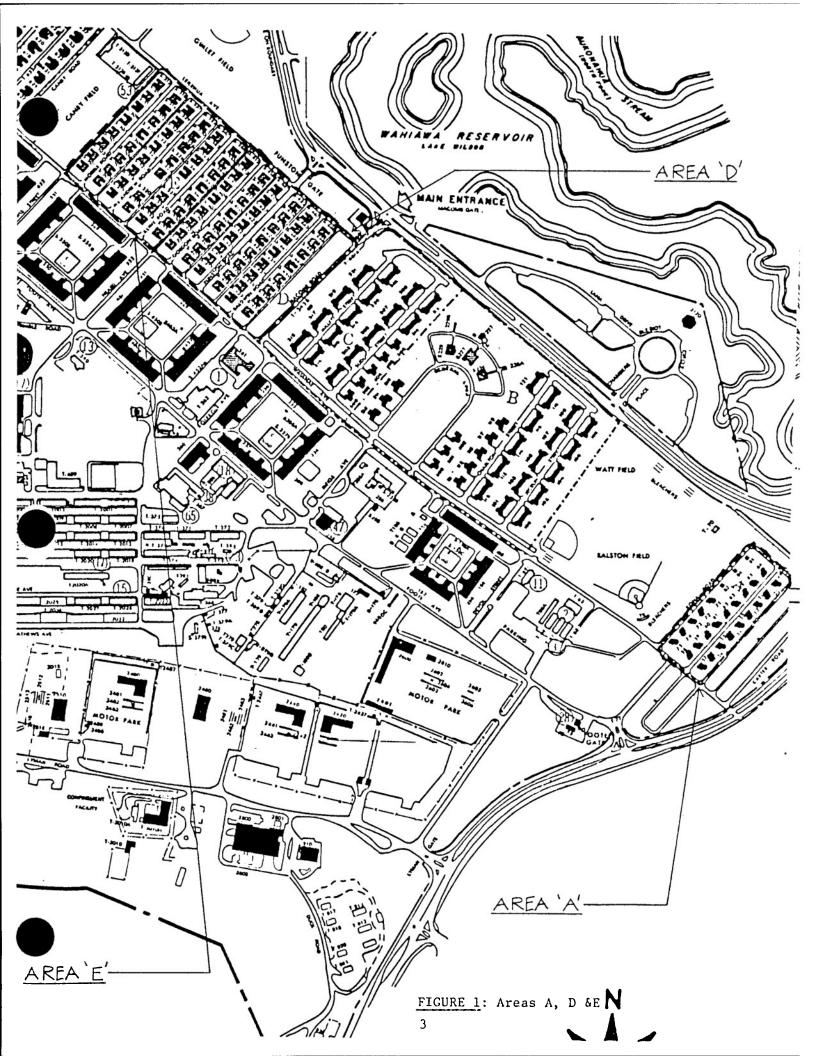
The family quarters included in this study consists of 22 different

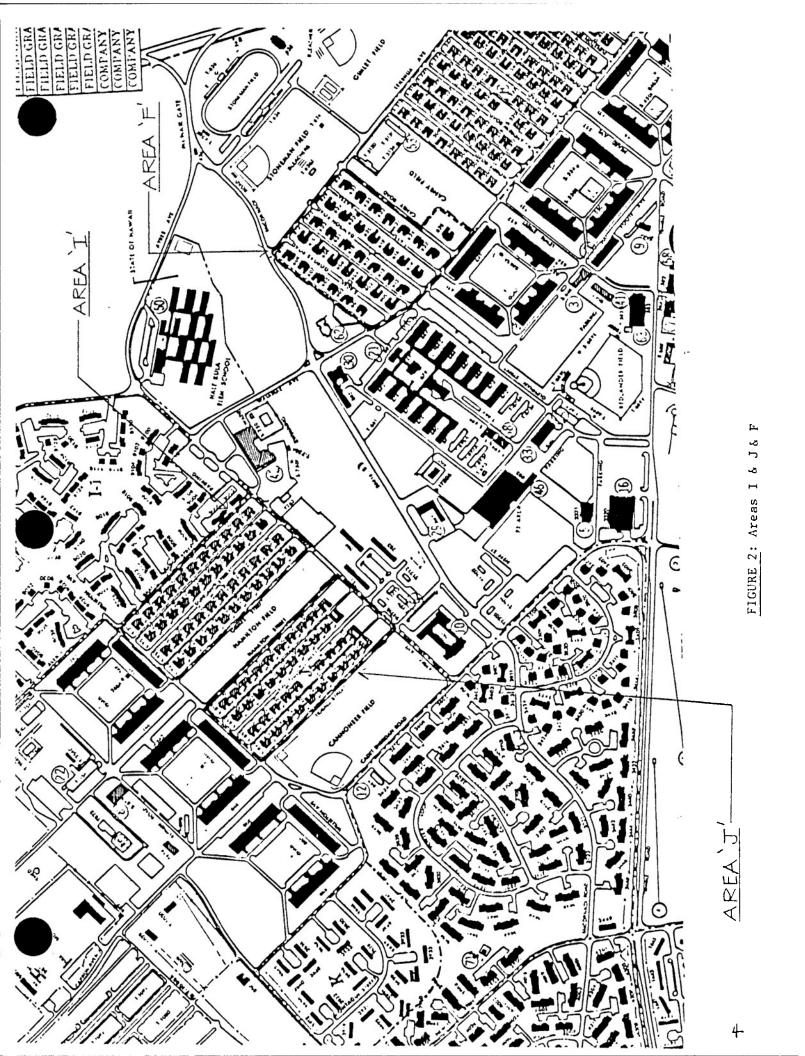
family housing unit types with a combined total of 758 units. The floor plans for a number of different units are virtually identical and have been treated as similar units in the study. Therefore, for the purposes of analysis there are effectively only 15 different quarter types. Floor plans for all the unit types surveyed are shown in Appendix D.

The only energy source currently used in the family housing quarters is electrical. No central air conditioning is provided for any of the housing types and it is estimated that less than 10% of the residents have installed their own air conditioning units. All existing built-in space heating units have been disabled and are currently inoperable.

II. Energy Field Survey:

An energy survey of existing conditions in each different housing unit type was conducted from January 8, 1990 to January 25, 1990. The data collected during this survey, including measurements of lighting levels, hot water temperatures and a survey of equipment & light fixtures, appears in Appendix E. Maps showing the areas included in this project are shown in Figures 1 - 3. Arrangements were made through the Oahu Consolidated Family Housing Office (OCFHO) to schedule field visits to a selected number of each unit type. The survey schedule included sixteen units of each type with only the first six units open to inspection to be actually surveyed. It was believed that this ratio would be adequate to obtain the required minimum of six surveyed units, but in practice the unit occupancy rate was much lower than anticipated. A summary of the number of homes visited during the field survey is shown in Table 1.





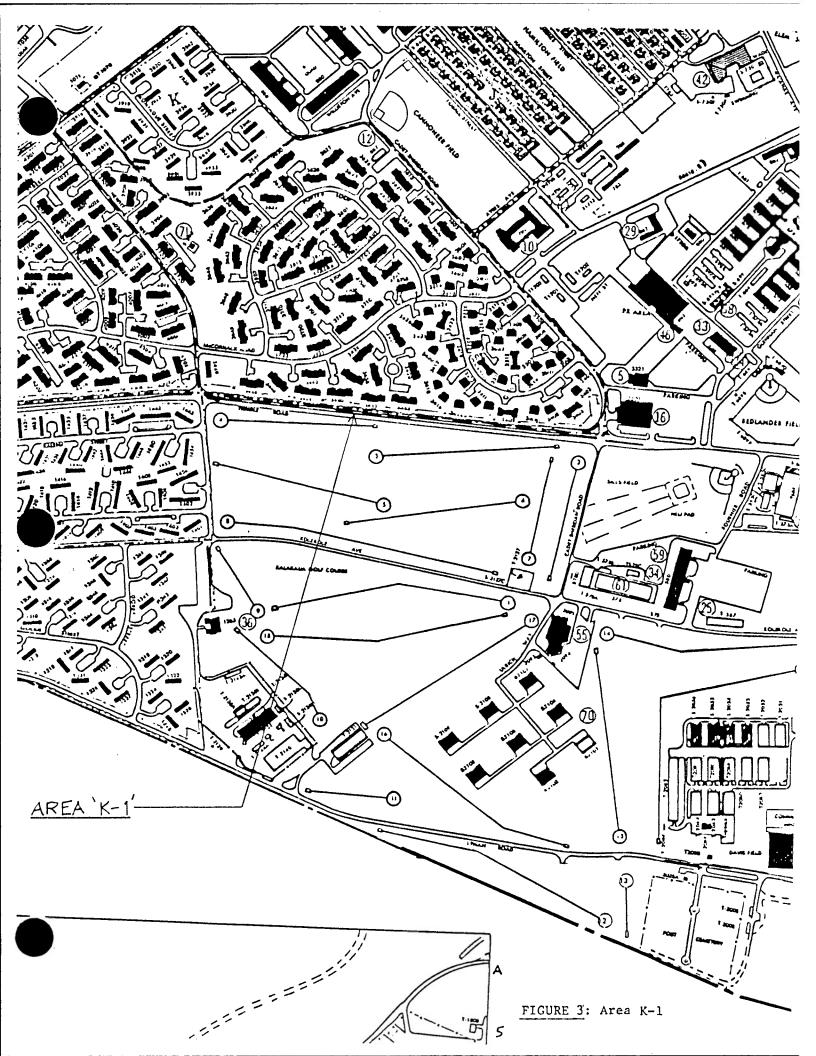


Table 1: Unit Type Data

UNIT TYPE	BASE AREA	NO. OF UNITS SURVEYED	NO. OF UNITS VISITED	TOTAL NO. OF UNITS IN THIS PROJECT
20-11	D, E, & I	4	14	14
20-111	D, E & I	4	18	122
20-IV	J	6		29
20-V	J	6		14
20-VI*	E	0	1	1
32-I	A	6		11 ,_
32-II	A	4	11	11
32-111	F	4	22	26
32-IV	F	4	9	9
	D, I & J	3 .	8	8
57-II	K-1	6		68
57-III	K-1	5	16	20
57-IV	K-1	6		136
57-V	K-1	6		102
57-VI	K-1	6		24
57-VII	K-1	4	6	6
57-VIII	K-1	6		24
57-IX	K-1	4	16 ·	16
60-I	K-1	6		20
60-II	K-1	6		16
60-III	K-1	6		76
71-I	Α	4	5	5
TOTALS		106		758

^{*} This unit was visited three times but the occupants were not home on all occasions.

Notes:

1. The following Unit Types have floor plans that are indisinguishable from one another and have been treated in the analysis as similar units.

Unit Types:

- a) 32-I and 32-II
- b) 57-II, 57-IV, 57-VI, 57-VIII & 57-IX
- c) 57-II and 57-VII

III. Present Energy Consumption and Costs:

A single primary transmission line from Hawaiian Electric Company (HECO) is brought into Schofield Barracks and submetered into various areas throughout the base. Electricity is purchased on a rate schedule "P" for large commercial power users. The Directorate of Facilities Engineering (DFE) monitors the base electrical meters and bills on-base customers at an average rate of \$0.068/KWH. The actual average rate that Schofield Barracks purchases energy from HECO is \$0.056/KWH.

An analysis of energy consumption by unit type is not possible due to the fact that there is no metering of individual housing quarters.

Metering is only done on an area by area basis, and each area encompasses a variety of different unit types. Thus, only average household energy consumptions for the study as a whole will be considered.

The OCFHO electrical bills for the months between 1/89 and 2/90 (inclusive) were obtained from the DFE. A copy of these bills is included in Appendix C-2. Examination of these records and discussion with the base electrical maintenance shop personnel indicates that the current monitoring of electrical meters is insufficient to determine the exact energy usage for all the areas under consideration. The DFE billings for the family housing energy usage do not appear to account for and correspond with all the areas included in this study.

Specifically, billings and electric meter readings do not include housing areas A, D, E, F, I, and J. Additionally, it appears that the

meters monitored by the DFE includes street lighting, and in some cases may also include loads from non-housing occupancies.

From the areas currently monitored by the DFE, the only housing area contained in the billing that corresponds to an area included in this study is Area K-1. If the street lighting loads are subtracted out, assuming 100 watt bulbs and 12 hours of operation, and it is further assumed that there are no other non-housing loads on this meter; the average household energy consumption for Area K-1 is estimated to be 1,623 KWH/month.

Based on the assumption that the energy usage in area K-1 is fairly representative, the current annual energy consumption for all 758 homes included in this study is approximately 14,762,800 KWH/Yr or 50,390 MBTU/Yr. This amounts to a current annual total cost for electricity of \$1,003,870/Yr based on an electrical rate of \$0.068/KWH.

The basewide average electrical consumption for this same time period was 10,410,700 KWH/month or 426,400 MBTU/year. It is estimated that the family housing areas under consideration thus accounts for approximately 12% of the total base electrical usage.

In order to determine a more accurate baseline energy consumption, more data is required from the DFE. Details regarding the non-residential loads measured on the monitored housing meters, and the exact base areas each meter feeds is needed.

IV. <u>Historical Energy Consumption</u>

Based on the energy usage in Area K-1, it appears that between 1988 and 1989 the average household energy consumption increased from 1,275 KWH/month to 1,623 KWH/month, constituting a 28% rise. In comparison, the total base electrical usage only increased by 4.4% from 9,970,667 KWH/month to 10,410,667 KWH/month during the same time period. Monthly electrical energy consumption for the average family housing unit and for the base at large is shown graphically in Figures 4-5.

- V. Energy Conservation Opportunity (ECO) Analysis and Recommendations:

 All reasonable energy conservation opportunities were analyzed for
 feasibility and energy savings potential. A tabular summary of the
 analysis for all unit types is included in Table 2. For summaries by
 individual unit types see Appendix B. The feasible ECO's identified in
 the study are listed in Table 3, and are summarized as follows:
 - Replace/Repair Broken Domestic Hot Water Heat Pumps: All the unit types included in this study have existing hot water heat pumps, but during our field survey it was found that approximately 20% of the heat pumps in place were broken and have been bypassed. The heat pumps currently installed are manufactured by Fedders.

 Separate analyses were performed to compare the economic feasibility of heat pump repair versus replacement. The repair option was found to be much more cost effective resulting in an annual savings of \$78,382 with an SIR of 6.23 and a payback period

Monthly Electrical Energy Consumption Average Family Housing Unit

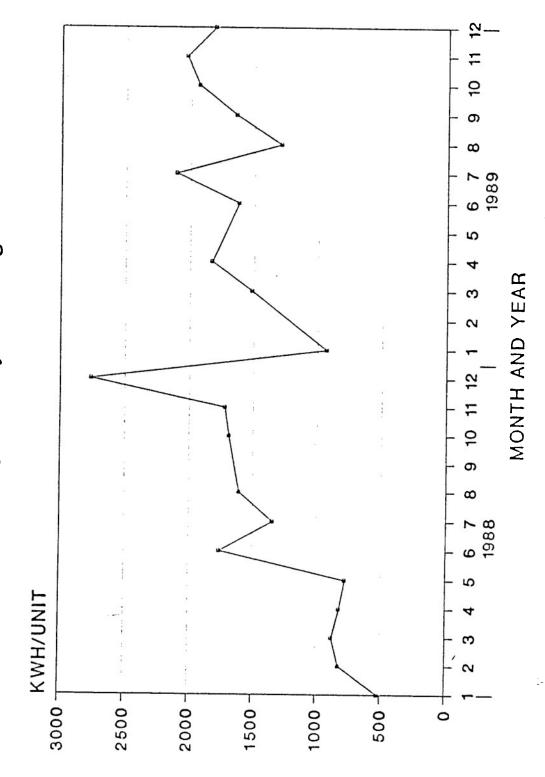


Figure 4: Family Housing Electrical Consumption

Monthly Electrical Energy Consumption Schofield Barracks Basewide

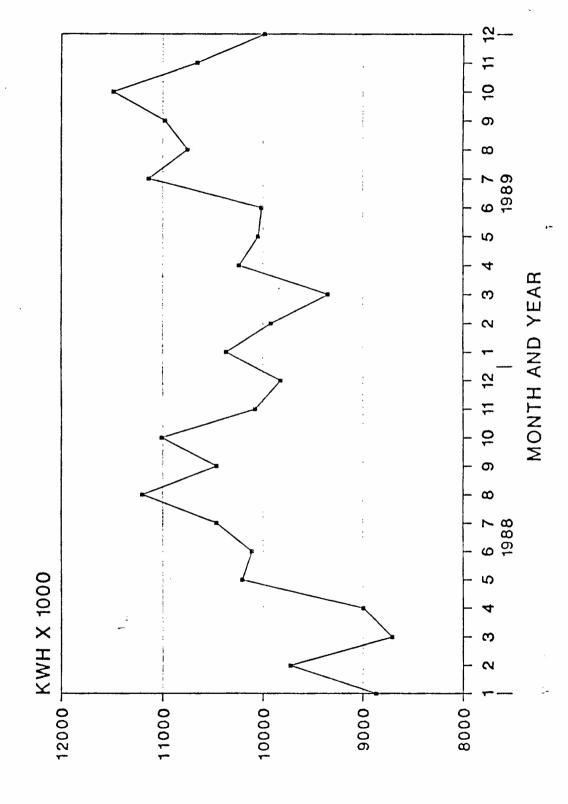


Figure 5: Overall Base Electrical Consumption

TABLE 2: SUMMARY OF ENERGY CONSERVATION OPPORTUNITIES FOR TOTAL PROJECT

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU	ANNUAL COST SAVINGS	ESTIMATED CONSTRUCTION COST	SIMPLE PAYBACK YEARS	SIR
1. Ins	Insulation					
1.1	i Insulation of Roof, Walls, etc. ! Insulation of Piping	 0.0038/LF	\$0.26/LF	 \$3.75/LF	14.4	0.81
2. Ext	Exterior Building Envelope					
2.1	Weather Stripping & Caulking	!	:	;	1	;
2.2		;	;	•	i	:
2.3		:	;	:	:	:
2.4		:	:	:	;	;
2.5		:	•	:	:	:
2.6		:	:	:	į	:
2.7	7 Solar Film	:	:	:	:	:
3. Lig	Lighting					
3.1	Reduce Lighting Levels	;	:	:	:	:
3.2		1,852	\$36,898	\$221,542	6.0	1.94
3.3	5 Energy Conserving Fluorescent Light & Ballast	64.194	\$ 1,278	\$140,549	110	0.11
3.4	Replace Kitchen Light Fixtures	(Combined w/ 3.3)				
3.5	Use More Energy Efficient Lighting Source	(Combined w/ 3.2)				
3.6	S Reflectors for Fluorescent Fixtures	:	;	:	:	:
3.7		:	;	:	;	:
3.8	3 Separate Switches to Control Lighting	:	;	:	:	;
3.9	Reduce Street Lighting	:	:	:	:	!
4. Hot	Hot Water					
4.1	Control Hot Water Circulation Pump	!	į	i	:	;
4.2	Heat Reclaim from Family Housing Condenser	:	:	;	;	;
4.3		:	:	•	i	;
4.4		5.810/unit	\$38.56/unit	\$1480/unit	36.9	0.11
4.5	becentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
4.6		:	;		į	:
7.7	Repair Broken Domestic Hot Water Heat Pumps	3,934	\$78,382	\$40,878	0.52	6.23

ical System Improve Power Factor Transformer Overvoltage Transformer Loading ystem Economizer Cycles (DB) Radiator Controls			
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Revise Boiler Controls		:::	:::
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TABLE 3: SUMMARY OF FEASIBLE ECO'S FOR TOTAL PROJECT

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU	TOTAL ANNUAL COST SAVINGS	ESTIMATED CONSTRUCTION COST	SIMPLE Payback Years	S. S
.	Repair Broken Domestic Hot Water Heat Pumps	3,934	\$78,382	\$40,878	0.52	6.23
2.	Replace Incadescent Lights	1,852	\$36,898	\$221,542	0.9	1.94
3.	Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
4.	Instantaneous Hot Water Heaters	5.810/UNIT	\$38.56/UNIT	\$1,424/UNIT	36.9	0.11
۲,	Energy Conserving Fluorescent Light & Ballast	64.19	\$1,278	\$140,549	110	0.11

* Assuming that 20% of the existing heat pumps are not operable

-

of 0.52 years, whereas the replacement alternative provided a SIR of 2.73 and a payback period of 3.3 years.

In the course of this study it was found that the OCFCO currently has a maintenance and repair project, now in the pre-award stage, to fix and maintain all HW heat pumps throughout the base housing. These plans coincide with our recommendation to implement a repair project for the broken heat pumps.

- Replace Incandescent Lights: Existing incandescent lamps can be 2) replaced with energy saving fluorescent adapters. This modification would reduce energy costs by \$36,898/year, for a resulting simple payback of 6.0 years and a SIR of 1.94. Fluorescent adapters are normally larger than their incandescent bulb counterparts, but ultra short double tube models are available that should be able to fit within the majority of existing luminaries. This study only included a limited site survey so we cannot confirm the exact number of lamps which can be replaced, but we estimate that the adapters will fit in approximately 70% of the existing fixtures. The estimated energy cost reduction shown above reflects this 70% diversity factor. Regardless of the actual number of lamps which are replaced the overall payback and SIR for this ECO will remain the same due to the proportional reduction in construction costs.
- 3) <u>Insulation of HW Piping</u>: The insulation of exposed HW piping in easily accessible areas would cost \$3.75/LF to install and would

produce an annual cost savings of \$0.26/LF. This calculates to a simple payback of 14.4 years and a SIR of 0.81 which would not make this project cost effective. It thus follows that the insulation of piping in inaccessible areas would also not be cost effective.

- Instantaneous Hot Water Heaters: To reduce heat losses through long runs of HW piping and the HW storage tank, instantaneous heaters could be installed at each location that hot water is required. Analysis for the longest run of piping (assumed to be uninsulated) shows that energy savings from this item would be \$38.56/unit. An estimated construction cost of \$1,480/unit with a payback period of 36.9 years and a SIR of 0.11 makes this project non-cost effective.
- 5) Energy Conserving Fluorescent Lights & Ballast: Existing fluorescent lights can be replaced with energy conserving type of fluorescent fixtures. This project would present a cost savings of \$1,278/year with a non-cost effective payback period of 110 years and a SIR of 0.11.

VI. Recommendations:

Based on our ECO analysis, we recommend that the following projects be implemented to reduce energy consumption:

		Energy Savings (MBTU/YR)	Cost Savings (\$/Yr)	% Savings	Project Type
1.	Repair Broken Heat Pumps	3,934	78,382	7.8	N/A
2.	Replace Incan- descent Lights	1,852	36,898	3.7	Low Cost
	Total	5,786	115,280	11.5	

Implementation of these projects would reduce energy usage by a total of 5,786 MBTU/Yr or a 11.5% reduction in current energy consumption, with an accompanying energy cost reduction of \$115,280/Yr or a 11.5% decrease in annual energy expenditures. The projected energy and cost savings are shown graphically in Figures 6-7.

In addition to the implementation of the two ECO's above, we also recommend that the base metering system be upgraded and reorganized such that the electrical energy consumption in the housing area can be monitored more effectively. In the existing system there is no metering of individual housing quarters, metering is only done on an area by area basis, with a variety of different unit types included in each area. Furthermore, descriptions from DFE personal indicates that industrial and street lighting loads may also be included on the area meters along with the housing loads. We were unable to obtain drawings detailing the meter circuiting and the DFE was unable to give us a description of the exact buildings which are monitored by each meter. Additionally, several of the meters are broken, so monitoring in some areas has not been done for an extended period of time. In examining the base electrical billings for the family housing areas, we were unable to

Projected Annual Energy Savings

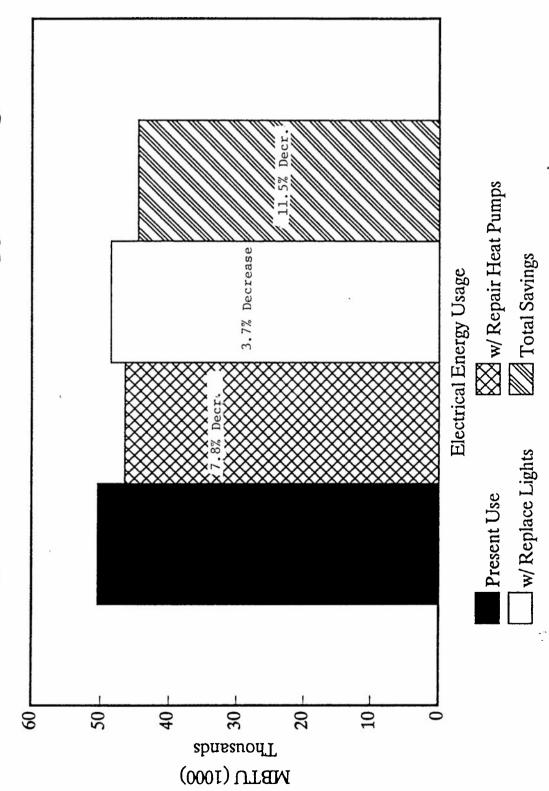


Figure 6: Projected Energy Savings with Recommended ECO's

Projected Annual Cost Savings

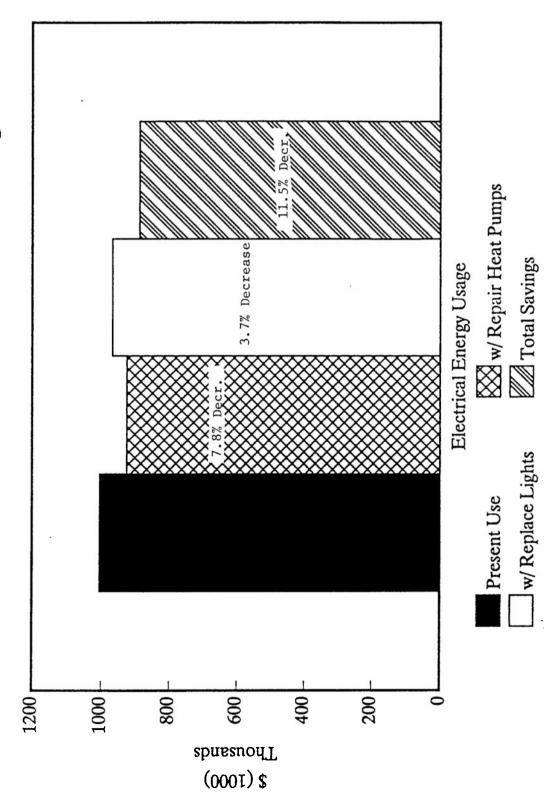


Figure 7: Projected Cost Savings with Recommended ECO's

correspond the meter readings to all the family housing areas under investigation. In order to get a baseline electrical consumption history we needed to extrapolate data from the monitored energy usage in one housing area only.

In order to effectively monitor the family housing energy consumption and to observe energy reductions resulting from the implemented ECO's, the base metering system must be improved. The DFE should reexamine the existing system and determine the specific loads monitored by each meter. If possible it would be beneficial to separate the housing loads from the industrial and street lighting loads through deductive metering. It would also be helpful to have individual metering of each housing unit in order to keep the residents aware of energy usage. However, this may be costly to implement and it is difficult to quantify the energy savings that could be obtained from such a plan.

VII. Programming Documents:

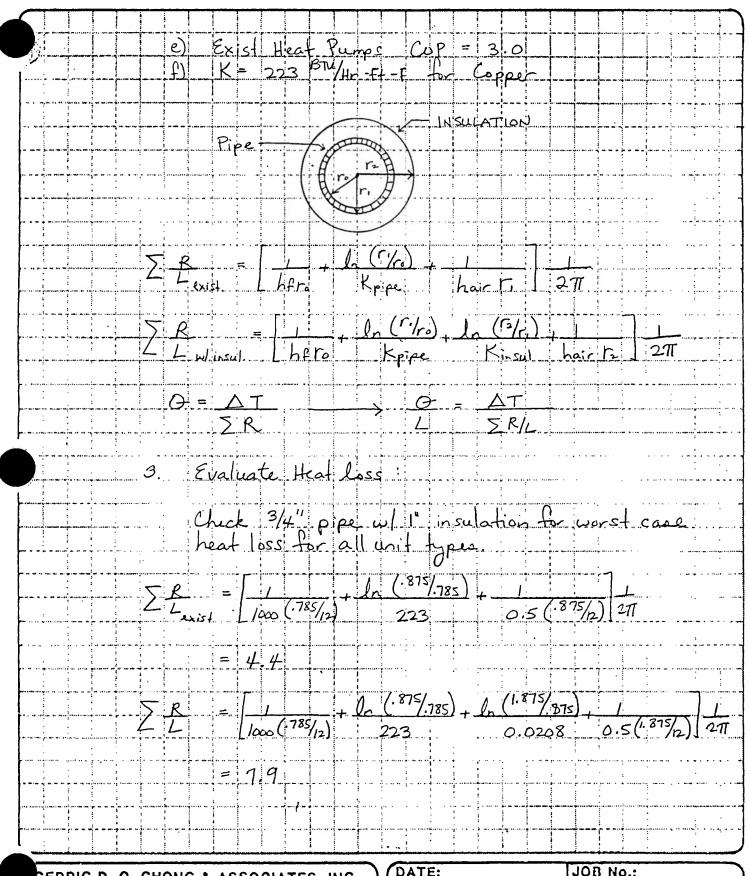
Low cost project documentation for the project "Replace Incandescent Lights" is included in Appendix E.

A project implemented by the OCFHO to repair and maintain the family housing heat pumps is already in the pre-award stage and, as such, no programming documentation is required for this ECO.

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CEDRIC D. O. CHONG & ASSOCIATES, INC.
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Telefax: (808) 847-8550

DATE:	10B No	·:
PROJECT NAME:		BY:
SUBJECT:		Sht. -



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DATE:	JOB No.:	
PROJECT NAME:	BY:	
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DATE:	JOB No.	
PROJECT NAME:		BY:
SUBJECT:		Sht. 1-3

			İ		:		1	200	1	100	
PAL ADD HW INSULATION TO	₹	37015	PI		\neg	ESTIMATOR	E CHE	CHECKED BY	SHEET	EnginePfing	HEETS
	QUANTI	TITY		-	LABOR		EQ	EQUIPMENT	*	MATERIAL -	
TASK DESCRIPTION	NO. OF UNITS	UNIT	MH/ JANIT	TOTAL HRS	UNIT	COST	UNIT	COST	UNIT	COST	TOTAL
3/4"4, 1" Thick Fiberglass	/	TF							3.15	3.75	3.75
1 all 0											
Service jacket											
7											
						٠		TOTAL	11		3.75/LF
								4			
								*			•
						,					
NOTE:											
O UNIT PRICES TAKEN FA	FROM	HEA	SN	MEC	HAM	CALC	5.7	DATA	1989	ed.	
										•	
•								·			
DA FORM 5418-R, Apr 85 CONTD											

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:_	REGION NO. PROJECT NUMBER
PROJECT TI	REGION NO. PROJECT NUMBER ADD HW TLE INSULATION TO ACCESSIBLE PIREFISCAL YEAR
DISCRETE P	DRTION NAME
ANALYSIS D	ATE ECONOMIC LIFE 25 YEARS PREPARED BY
	#ENT COSTS #STRUCTION COST OH (5.5%) SIGN COST (10%) ERGY CREDIT CALC (1A+1B+1C)X.9 LYAGE VALUE OF EXISTING EQUIPMENT FAL INVESTMENT (1D-1E) ### 3.75 LF
	SAVINGS (+) / COST (-) IS DATE ANNUAL SAVINGS, UNIT COST \$ DISCOUNTED SAVINGS
FUEL	COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU() MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
A. ELE B. DIS C. RES D. NG E. COA	T \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
F. TOT	AL \$ 0.26 \$ 3.15
Λ. ΑΝ	ERGY SAVINGS (+) / COST (-) NUAL RECURRING (+/-) 1) DISCOUNT FACTOR (TABLE 1) 2) DISCOUNTED SAVING/COST (3A X 3A1) \$ 0
B. NO	N RECURRING SAVINGS (+) / COST (-) EM SAVINGS \$ (+) YEAR OF DISCOUNT DISCOUNTED SAV- COST \$ (-)(1) OCCURRENCE(2) FACTOR (3) INGS (+) COST(-)(4)
	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
С. ТО	TAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Ba4) \$ 0
(1) 29 a, b, c.	OJECT NON ENERGY QUALIFICATION TEST AX NON ENERGY CALC (2FS X .33) IF 3D1 IS = OR 3C GO TO ITEM 4 IF 3D1 IS 3C CALC SIR = (2FS+3D1) : IF = IF 3D1b IS = 1 GO TO ITEM 4 IF 3D1b IS 1 PROJECT DOES NOT QUALIFY
4. FIRST	YEAR DOLLAR SAVINGS 2F3+3A+(3B1d: YEARS ECONOMIC LIFE) \$ 0.26
5. TOTAL	NET DISCOUNTED SAVINGS (2F5+3C) \$ 3.15
6. SIR (F 1 PROJECT DOES NOT QUALIFY) (SIR)=(5: 1F)= 0.81

The existing that water piping for all other unit types included in this study are what insulated and art buried In the conc. Slab or made otherwise inaccasible. Insulating these lines would recessible perputing all the the piping above ground and would not be a practical approximation of the insulation of even accessible piping at not cost effective.		w			1					/				· · · · · · · · · · · · · · · · · · ·		1 i										
In the conc. slab or made officiouse inaccessible. In sulating these linea would be consistate remouting all the the piping above around and would not be a practical		,														1			· ·; . · · · •							
In the conc. slab or made otherwise inaccessible. In sulating these lines would be consisted persuling all the the piping above around and would not be a practical															· ·											
In the conc. slab or made otherwise inaccessible. In sulating these lines would be consisted persuling all the the piping above around and would not be a practical	 										- ,															
In the conc. slab or made officiouse inaccessible. In sulating these linea would be consistate remouting all the the piping above around and would not be a practical	 :						•								· · · · · · · · · · · · · · · · · · ·								· · · · · · · · · · · · · · · · · · ·			
In the conc. slab or made otherwise inaccessible. In sulating these lines would be consisted persuling all the the piping above around and would not be a practical			······																					• ••		
In the conc. slab or made otherwise inaccessible. In sulating these lines would be consisted persuling all the the piping above around and would not be a practical																										
In the conc. Slab or made otherwise inaccessible. In sulating these lines would recessitate remuting all the Hw piping above ground and would not be a practical						:																		• • • · ·		
In the conc. slab or made otherwise inaccessible. In sulating these lines would be consistate perputing all the Hw piping above around and would not be a practical						· •								· · · · · · · · · · · · · · · · · · ·												:
In the conc. slab or made otherwise inaccessible. In sulating these lines would be consistate perputing all the Hw piping above around and would not be a practical		i 1				: : : :								```												
In the conc. slab or made otherwise inaccessible. In sulating these lines would be consisted persuling all the the piping above around and would not be a practical												Γ	7	9 or or of	ð											
In the conc. slab or made otherwise inaccessible. In sulating these lines would recessitate rerouting all the			AT OF	54; m	pi	pir S ~	19 19	u	100	و الما الما	9	שס	nd ox	CV VI	id	ωο (-)	uld S	h	Ot Wr	ام ام	e ha I	a	IL.	AC L	nsu	latio
The existing that water piping for all other unit takes included in this study are not insulated and are buried			ln.	su	la-	lin.	۹	4	ومو		in	اجما	<u>.</u> ယ	ايده	d	بور	2.	cil	ate	¥	الاع	ou-	inc	\ \0		
			Th in	و د ا	ex ud	ist ed	na in) -{	امر ونظ		ul tu	dy	P	pi e	na H	fort	r a	<u>ال</u> دي	od	Le d	ء د	ni nd	a	ð	zea. Du	ried

SUBJECT:

Sht. 1-6 01

2. Exterior	Building Envelope	
	- Stripping and Caulking	
1 i i i i i i i	<u> </u>	s in this study.
Systen	plicable for all unit types of the units have a central, so infiltration or extilted to cause energy losses.	ration of air
Will no	ot cause energy losses.	
2.2 Vestible	فح	
Not a	oplicable for all unit types	in this study.
The un entrin	pplicable for all unit types nits do not have central og outside air is not a p	air conditioning so
<u> </u>		
Financia di Contra di Cont	Dock Seals	
Not a	pplicable. No units have	loading docks.
24 Reduct	ion of Glass Area	
Not ap	plicable for all unit types	in this study.
The uni	plicable for all unit types to do not have central as	tration area will
not co	denegy ustage.	
	DATE	

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DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 2-1

2.5	Low i	Emissivit	y Window	
	Not a	ipplicable	for all units i	n this study. The rir conditioning system
	units So rec	do not	have central a	hround the wind system
	will r	20t lowe	r energy usag	brough the wholews
2.6	Water	Spray	Roof Cooling	
	Nat a	pplicable	e for all units	in this study. The
	System	ms so re	duction of roo	air conditioning F heat gain will not
	Buer	energy	usage.	0
	,			
2.7	Solar			
	Not a	applicabl	le for all units	in this study. The
	545A	ems 5	o reduction of	heat gain thruthe
	Winde	ows do	es not effect e	negglurage.

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DATE:	JOB No.:		`
PROJECT NAME:		BY:	
SUBJECT:		Sht.	.2-2-

<u>}</u>					
3	Lighting				
L	0 0				
3	1 Keduce	Lighting Les	re/s		
					7 /
	1. Compa	rison of mea	sured Vs. 12 Con	nmended lighting	IRVRIS:
	.,,	1, 1,		¥0 1	,
	Unit	Location		*Recommended	
	TYPE		(Fc)	(FC)	
	<u>-</u>				
	20-1	LIR	3 .	10	
		DIR		Jo	
		B/R 1	3	10	
		B/R 2	4		erationer erasionamentere de de c
		B/R 3	3	10	
		B/R 4	3		
·,		B/R 5	6		
		B/RG	3		
<u> </u>		, Кл.	4	20	·
		LAUNDRY	4	20	~
		PANTRY	6		
	. 	BATH 1	8	20	414 114 41 41 114
		BATH 2	3		
		LANAI	3	/0	
	20-11	₩.	2	10	
		P/R	6		
		B/R I	6	Jo	
		B/R 2	3		
• !		B/R 3		/0	
;		B/R 4	5	10	
		BIR5	8	/0	
		KIT.	. 5	20	
	<u> </u>	LAUNDRY	5	20	
		PANTRY	5	10	mani gimanika in a a a a a

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DATE:	JOB No.:			
PROJECT NAME:		BY:		
SUBJECT:		Sht.	3-1	_

	UNIT	LOCATION	Ava. Heasured	*Recommeded	
	74PE		(FC)	(FC)	
		Bath	14	20	:
		Toilet	4	20	# 11.000 11.00 11.00 1 1
		Lanai	2	10	:
<u> </u>	20-JV	4R	7	/o	• • • • • •
!		PIR	5	/0	
		B/RI	3	10	
		B/R2	:3	10	
		B/R3	4	Jo	· · ÷
		BlR4	5	10	
		Кп.	19	20	
		LAUNDRY	6	20	
· · · · · · · · · · · · · · · · · · ·		BATH I	5	20	,
		BATH 2	5	20	
			6	/0	
	20-又	LANA! LR	2	10	· · · · <u>- :</u> · · · - :
		DIR	6	*	
		B/R I	4	10	
			3		
		BIR 2	30	/0	
		KIT. LAUNDRY		20	
		BATH	5	20	
		TOILET	15 G	20 20	
			2	/0	
	7-1	LANAI			<u></u>
	32-I	LR	13	10	
		B/R 1	/0	10	
		B/R 2	10	/o 20	
· · · · ·		BATH V T	28	20	· /· · · · · · · ·
		KIT. LAUNDRY	32 20	20	

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DATE:	JOB No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-2

}	WIT	LOCATION	AVG MEASURED	* RECOMMENDED
	TYPE		(FC)	(FC)
	32-II	same as 32	-1	
	32-711	UR.	5	/0
		D/R	10	10
		B/R1	2	10
		B/R 2	5	10
		B/R3	2	10
		MAID'S	4	10
		BATH 1	/3	20
		BATH 2	6	20
		KIT.	8	20
:		LAUNDRY	8	20
:		LANAII	5	10
		LANA / 2	6	10
	32-IV	LR	5	10
		P/R	8	10
		BIRI	3	. 10
		B/R 2	4	10
		B/R 3	4	10
		B/R4	4	10
		HAIDS	5	/0
		BATH 1	8	20
· · · · · · · · · · · · · · · · · · ·		BATH 2	6	20
• • • • • • • • • • • • • • • • • • • •		KIT.	5	20
· • • • • • • • • • • • • • • • • • • •		LAUNDRY	7	20
		LANAII	2	.10
		LANAI 2	4	/0
4				
				•

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DATE:	JOB No.:	
PROJECT NAME:	E	3Y:
SUBJECT:	S	Sht. 3-3

1	UNIT	LOCATION	AVG HEASURED	*RECOMMENDED
1	TYPE		(FC)	(FC)
	57- T	4R	5	Jo
		P/R	4	10
		B/R I	3	10
		B/R 2	3	10
		ВАТН	9	20
		KIT.	8	20
		LAUNDRY	7	20
	57-II	L/R	9	10
		B/R I	5	Jo
		B/R 2	5	10
		B/R3	5	/0
		TOILET	7	20
		BATH	7	20
		KIT.	25	20
		LAUNDRY	5	20
1	57-III	HR	4	10
		B/R I	3	/ 0
		B/R 2	3	10
		B/R3	3	/0
		BATH	22	20
		TOILET	9	20
		KIT.	27	20
		LAWDRY	5	20
	57-区	Same as (Loit Tune 57-II	· Tanaga and an anti-anti-anti-anti-anti-anti-anti-anti-
			Lit Type 57-II	
· · · · · · · · · · · · · · · · · · ·				
		, , , , , , , , , , , , , , , , , , , ,		
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DATE:	JOB No.		_
PROJECT NAME:		BY:	<u>, , , , , , , , , , , , , , , , , , , </u>
SUBJECT:		Sht.	3-7

	wit	LOCATION	AVG MEASURED	Recommended
)	TYPE		(FC)	(fc)
	57-V	L/R!	9	10
		BIRY	3	10
		BIRZ	3	10
		BATH	20	20
		TOILET	9	20
		KIT.	28	20
		LAUNDRY	8	20
	57-VI	Same as U	nit Type 57-II	
			8	
	57-VII	Same as (L	it Type 57-I	
2				
	57 - VIII	Some as 11	nit Type 57-II	
			U	
	57-IX	same as U	nit Type 57-II	
			8	
	:60-I	LIR	5	10
		BIRI	5	10
		B/R2	5	/0
		ВАТН	2/	20
		KIT.	32	20
	60-II	L/R	7	/0
:		BIRI	5	10
		B/R 2	5	70
		B/R3	5	/0
		BIR4	5,	/0
		BATH	39	20
: :		and the state of t	<u> </u>	
: :		TOUST	18	7.0
		TOILET KIT.	/8 26	20 20

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DATE:	JOB	No.:	
PROJECT NAME:		BY:	
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		U	115		La	ATI	oN	AV	GHEA	SURED	*R	ECOM	1ENDE.	Ď
		<i>T4</i>	PE.						(Fc	:)		CFC		
	<u>.</u>			_										; ;
	· •	4	0-777			LIR.			6			Ю		<u>.</u>
	ļ			_		3/R	<i>j</i>	<u> </u>	4			/0		
					ť	3/R	2	<u>;</u>	4			þ		. :
	<u>.</u>				<u>.</u>	B/R.	3		4			10		
	<u> </u>				E	BATI	4		15			20		
	<u>.</u>					TOIL	ET		23			20		
<u> </u>	<u>.</u>			<u> </u>		<u> </u>		1	26		: :	20		:
	<u>.</u> 	*	رمل	ues_	end	of	IES	rco	more	ded ra	ngcat	" illum	ination	
			اد:	5 19	87	Aρ	وايخه.	tion '	Volum	e, fgi	ve 2-	1		
	:	: :		: ; :- : : : : : : : : : : : : : : : : : :			<u> </u>	<u> </u>	! 	0		<u> </u>		· ····
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:	2.		The	abo	sve	Con	npar	NoZr	show	r that	the o	xisting	lighti	٠٩ :_
; 	<u>:</u>		leve	2/2	thr	ونيم	hout	the	units	له ما	ready	inadd	gulte.	<u> </u>
			for	th	e w	انص	brity	of r	ممرده	. Red	uctio.	a lie	Phting.	
			lev	els	21	not.	a y	iable	optio	n.		0		:
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PROJECT NAME:

SUBJECT:

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BY:

Sht. Of 3-6

3.2 Repla	ce Incadescent	Lighting	
	<u> </u>	d J	
1. Ass	sumptions:		
a	Incadescent la	nos will be rea	placed with energy
	savina fluoresce	ot retrofit ad	aptors (ballast a
	lampy that can	a be utilized	in the existing
	incadescent f	ixtures.	
Ь.	Existing lighting	a levels will be	increased to levels
			inating Engineering
	Society (IES)	p& Hilhandbk	11900 If this carnot
	be achieved us	ing the existin	a fixtures, lighting
	levels will just	be increased a	shigh as possible
6	New fluorescent	adaptors will	have the following
	energy usage:		have the following
	ADAPTOR SYSTEM	LUMENS	
	WATTAGE	LUTIENS	INCADESCENT EQUIV. WATTAGE
	7	250	25
	9	400	60
	15	900	75
		i : !!!	
2. Co	imparison of En	ergy Usage:	
	1		
	imparison of En e following tab		
	1		

CEDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawaii 96819 Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:		
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EDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawaii 96819 Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:		
PROJECT NAME:		BY:	
SUBJECT:		Sht. Of	3-18

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ENERGY CW)	60 C C	3	
ENERCY USED(W)	\$ 75 70	٧.	24 X XS
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AREA (SF)	# 25 E	7	SAR
ENERGY USER	225 75 75 135	fixfud 75	## X
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WAIT TYPE	7.7.2	,	No7E;

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Telefax: (808) 847-6550

DATE:	JOB No.:		
PROJECT NAME:		BY:	
SUBJECT:		Sht. Of	3-19

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	LCKATION			LR	BIR	BIR	BA	1011	KT.		1/1/	8/8	BIR	8/18	1/2	BATH	<u>6</u>		77	1/8	18	18	BA	K	KIT.	
				······································				· · · · ·			\mathcal{I}	•		·····:	!		:		1111							
	UNIT	7yPE		GOT		· · · · · ·			·	- 4	G0-T		•		:				[60-III	:	••••••	:		141.0		v
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DATE:	10B	No.:	
PROJECT NAME:		BY:	
SUBJECT:	· · · · · · · · · · · · · · · · · · ·	Sht. Of	3-20

			And the second s		The second secon	
ENERGY SAVED	8					
ENERCY) USED(W)	Ž					
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DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-21 Of

). }:							
, j.,		3.	Summary	of Savi	ngs (per w	34)	
					4		
			Unit	LOCATION	LIGHTING	HRS PER DAY	DAILY
					SAVINGS (W)	OPERATION	SAVINGS (KW
			Type				
			20-II	LR	38	6	0.228
				D/R	340	4	1.360
				BIRI	340	4	1.360
				BIR2	85	4	0.340
		************		B/R3	85	4	0.340
				B/R4	85	4	0.340
				B/R5			
				BIRG			
	:			BATH I	30	: 4	0./20
				BATH2	185	4	0.740
				KIT.	45	4	0.180
	-			PANTRY	128	2	0.256
)	! !			LAUND.	135	2	0.270
		*		LANAI	(,0	6	0.360
			TOTAL				= 5.894 KWH/D
Assu	emina	607.		can be repla	ad Total =	0.60 (5.89× KW)	
	J		ANNUAL	ENERGY SAI	INGS (per W	$\alpha(t)$	
			= 3	3.536KW/DA	14 × 365 Days	s/ur = 1.290	O KWH/YR
:			***				
			ANNUAL	COST SAVI	NGS		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
				1 290 KWH/	4r × (\$0.00	18/KWH) = \$8	7.72
:							
••••••••••••••••••••••••••••••••••••••			Cost for	Fluorisce	t Adaptors	(see attached)	\$ 835
			Assumina	aly 60% t	Le lamos con la	replaced = 8	35 (.60) = 501
			Parback	= \$ 50	0/	2 replaced = 8 = 5.7 yrs	
			U	\$ 87.	72 /4R		
•							
:							

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Telefax: (808) 847-6550

DATE:	JOB No.:		
PROJECT NAME:		BY:	
SUBJECT:	 	Sht.	3-22

	EETS		TOTAL			102.92	- 1	526,87		429.79	62.98		31 07	8 29	•	836.84))	¥835						
	OF	MATERIAL	COST			80		418			(°		9)	3-				5						
3	SHEET	MA	UNIT	8/		20		22		36	(100	(157	77)											
SAY \$ 38.20		EQUIPMENT	cost							Subto	PROFIT	η/ Ο	. > 3	2,00	2000	TOTAL								
2)	CHEC	EOL	UNIT																					
21.85# =	STIMATOR		cost	0		22.92	1	108.87															·	
LB.		LABOR	UNIT	38.20	1			→																
		۲	TOTAL			0.0		2.85																
21.81+			MH/ TIMIT			J.0		0.15																
# 21.		TITY	UNIT	8A		¥3	į	¥																ħ.
	N	U QUANTITY	NO. OF UNITS	0		#		6/																
Labor Rat:	Replace Incadescent L		TYDE 20-IL	Fluores. Adapter		11		11														·		DA FORM 5418-R, Apr 85 CONTD
	PROJECT		tunit	9 W		3		15 E																DA FORM 5

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

FOCV	NTION:	REGION NO	PROJECT NUMB	ER
PROJ	DECT TITLE Replace Inca	descent Ligh	nts Fisc	AL YEAR
DISC	CRETE PORTION NAME UNIT T	JPE 20-110	····	
ANAL	YSIS DATE	ECONOMIC LIFE	25 YEARS	PREPAREO BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) D. ENERGY CREDIT CALC (1A+18 E. SALVAGE VALUE OF EXISTING F. TOTAL INVESTMENT (10-10)	H-1C)X.9 EQUIPMENT		1/ 27.56 50:70 0.79 520.79
2.	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS	UNIT COST \$ 01	SCOUNTED SAV	THGS
	COST SAVINGS FUEL \$/MBTU(1) MBTU/YR			
	A. ELEC \$ 19.93 4.403 B. OIST \$ C. RESID \$ O. NG \$ E. COAL \$	\$ 87.72	12.12	\$ /063 \$ \$ \$ \$
	F. TOTAL	\$.87.72		5_/063
3.	NON ENERGY SAVINGS (+) / COSTAL ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TAIL (2) DISCOUNTED SAVING/CO		\$_ \$_	0
	B. NON RECURRING SAVINGS (+ ITEM SAVINGS \$ (+) COST \$ (-)(1)) / COST (-) YEAR OF COCCURRENCE(2) F	DISCOUNT FACTOR (3)	OISCOUNTED SAV- INGS (+) COST(-)(4)
	a\$			\$ \$
	C. TOTAL NON ENERGY DISCOUN	TEO SAVINGS (+)	/ COST (-)	(3A2+3Ba4) \$ <u>O</u>
	D. PROJECT NON ENERGY QUALT (1) 25% MAX NON ENERGY CALC a. 1F 3D1 IS = OR 3C b. 1F 3D1 IS 3C CALC c. 1F 3D1b IS = 1 GO d. 1F 3D1b IS 1 PROJE	(2F5 X .33) GO TO ITEM 4 SIR = (2F5 TO ITEM 4	+3D1) : 1F =	<u>350.84</u>
4.	FIRST YEAR OOLLAR SAVINGS 2F	3+3A+(3B1d : YF.	ARS ECONOMIC	LIFE) \$:87.72
۶.	TOTAL NET DISCOUNTED SAVINGS	(2F5+3C)		\$ 1063 7
6.	SIR (IF) PROJECT ODES NOT	QUALIFY) (SIR)	=(5 : 1F)=	2.04

7)	UNIT	LOCATION	LIGHTING	HRS PER DAY	DAILY
	TYPE	20021700	SAVINGS(W)	OPERATION	SAVINGS (KWH)
				Ut displice	3/4/1402 (100:12
	20-11	LIR	60	6	0.360
		DIR ·	240	4	0.960
	The second secon	BIRI	120	4	0.480
		BlR2	120	4	0.480
		BIR3	120	4	0.480
		Blr4	132	4	0.528
		Blas	132	4	0.528
		BATH	204	4	0.816
		TOILET	51		0.051
		KIT.	60	4	0.240
		LAUND.	60	2	0.120
, ; ;		PANTRY	60	2	0.120
	· · · · · · · · · · · · · · · · · · ·	LANAI	60	G	0.360
<u> </u>	TOTAL.				5.523 KWH/DAY
Assumia	ANNUA	ENERGY!	CANINGS (pur LWH/DAY × 365	unitl	70(5.523) = 3.866k
	8			3.136	,1,710, 19k
	ANNUA	1 COST	AVINGS		
	ANNUA =	1 COST	AVINGS	268/KWH) = A	
	<u>.</u>	L COST S 1,411 Ku	AVINGS H/yr × (#0,0	068/KWH) = \$	95.95
	<u>.</u>	L COST S 1,411 Ku	AVINGS H/yr × (#0,0	068/KWH) = \$	95.95
A ssun	<u>.</u>	L COST S 1,411 Ku	AVINGS H/yr × (#0,0	068/KWH) = \$	95.95
A ssum	<u>.</u>	L COST S 1,411 Ku	AVINGS H/yr × (#0,0	068/KWH) = \$	95.95
Assun	<u>.</u>	L COST S 1,411 Ku	AVINGS H/yr × (#0,0	068/KWH) = \$	95.95
A ssum	Cost. Taybo	COST I 1,411 Ku for Fluore 09.07 fle las ck = \$	AVINGS Hlyr × (#0,0 scent Adap rs can be repla 563.5 95.95 lyr	obs/kwH) = A tors (see a Hac ud Total = 0 = 5.9 ye	95.95 Led): #805 .70(805)=\$63.50 s
Assum	Cost. Taybo	L COST S 1,411 Ku	AVINGS Hlyr × (#0,0 scent Adap rs can be repla 563.5 95.95 lyr	068/KWH) = \$	95.95 Led): #805 .70(805)=\$63.50 s
Assun	Cost. Taybo	COST I 1,411 Ku for Fluore 09.07 fle las ck = \$	AVINGS Hlyr × (#0,0 scent Adap rs can be repla 563.5 95.95 lyr	obs/kwH) = A tors (see a Hac ud Total = 0 = 5.9 ye	95.95 Led): #805 .70(805)=\$63.50 s
Assun	Cost. Taybo	COST I 1,411 Ku for Fluore 09.07 fle las ck = \$	AVINGS Hlyr × (#0,0 scent Adap rs can be repla 563.5 95.95 lyr	obs/kwH) = A tors (see a Hac ud Total = 0 = 5.9 ye	95.95 Led): #805 .70(805)=\$63.50 s

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DATE:	JOB No.:		
PROJECT NAME:		BY:	
SUBJECT:	· · · · · · · · · · · · · · · · · · ·	Sht.	3-25

March Colored Colore	RATE: \$121	11+75	7.18	. 38	8	SAY	438	y L				
Adopter 15 2A 0.15 1.20 58.24 45.84 Apple 16 24-51 444) Apple 17 1074 UNIT MRS PRICE COST PRICE C	Replace Incadescent Li	apts				_	ESTIMATOR	CHEC	KED BY	SHEET	OF.	TS
aplen 6 EA 0.15 1.20 58.24 45.84 18 144 18 Jacohn 0 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 0 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 15 EA 0.15 2.25 \$ 85.75 20 0 Loughlan 15 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 15 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 15 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 \$ 85.75 20 0 Jacohn 16 EA 0.15 2.25 20 0 Jacohn 16 EA 0.15 2.25 20 0 Jacohn 17 EA 0.15 2.25 20 0 Jacohn 18		QUAN	LITY	/ / / /	, .	BOR		ğ	JIPMENT	ž	ATERIAL	
aplen 8 60 0.15 1.20 58.24 45.84 18 144 18 deplen 0 50 0.15 0.20 0 20 20 0 20 0 0 20 0 50 0 0 20 0 50 0 0 0 20 0 50 0 0 0 0 0 0 0 50 0 0 0 0 0 0 0	20 20	NO. OF UNITS	UNIT MEAS	LINO LINO		PRICE	COST	PRICE	COST	PRICE	l	TOTAL
aple 8 & 0.15 1.20 58.24 45.84 18 144 18 Japha O & A O.15 0 0 0 20 0 0 Japha IS & O.15 2.25 V 85.35 22 336 4 Japha IS & O.15 2.25 V	0											
Japhn 0 54 0.15 0 0 20 20 20 0 0 0 0 0 0 0 0 0 0 0 0 0	1	α	73	0.15		200.77	45.84			8/	144	
1 (5 24 0.15 2.2 \$ 85.75]	0	\$	0.15	0		0			2	0	0
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ot w/ (152) 6 1									Prof.t	\vee		85'05
ot. "/ (524-3744) (524-3744)									H/0	(15%		99.96
ot. w/ (524-37 44) (524-37 44)										(47		30.65
ot w/ SAY # 805									Bond	(1%		7.97
ot. w/ Say # 805												
οt. ω/ (524-37 44) β)									Total			· ·
0 t, ω/ (5 2 ψ- 57 ψψ) β)												
(524-37 44)												805
(524-37)	cust anote										\	
	a Lighting (524-37	1 (74										
	1 (La mon)						,					
	-											
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LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOC/	TION:		REGION NO	PROJECT NUM	BER	_
PROJ	ECT TITLE Re	place Incac	descent Lig	hts Fis	CAL YEAR	-
						_
ANAL	YSIS DATE		ECONOMIC LIFE	25 YEAR	S PREPARED BY	
	INVESTMENT COST A. CONSTRUCTIO B. SIOH (5. C. DESIGN COST D. ENERGY CRED E. SALVAGE VAL F. TOTAL INVES	N COST 5%) (10%) IT CALC (1A+1B UE OF EXISTING 1MENT (1D-1E)		\$\$	63.50 30.99 56.35 585.76 	•
۷.	ENERGY SAVINGS ANALYSIS DATE A			ISCOUNTED SA	VINGS	
	FUEL \$/MBT	U(1) MBTU/YR(FACTOR(4)	SAVINGS(5)	
	A. ELEC \$ 19. B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	93 <u>4.82/u</u> ,	m+ \$ 95.95 \$ \$	12.12	\$ 1/43 \$ \$ \$ \$	
	F. TOTAL		\$ <u>95.95</u>		1/63	
3.	NON ENERGY SAVI A. ANNUAL RECU (1) DISCOU (2) DISCOU	IRRING (+/-) INT FACTOR (TAB		\$_ \$_	<u> </u>	
	B. NON RECURRY ITEM SA	VINGS \$ (+)	YEAR OF	DISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(. 4)
	a				\$ \$ \$\$	_
			TED SAVINGS (+)	/ COST (-)	(3A2+3Ba4) \$ C	_
	c. 1F 3D)	N ENERGY CALC IS = OR 3C IS 3C CALC b IS = 1 GO	(2F5 X .33) GO TO ITEM 4 SIR = (2F5	5+3D1) : 1F =	<u>\$ 383.79</u>	
4.	FIRST YEAR DOL	LAR SAVINGS 2F	3+3A+(3B1d : YF	TARS ECONOMIC	LIFE) \$: 95.9	<u>5</u>
5.	TOTAL NET DISC	OUNTED SAVINGS	(2F5+3C)		\$ 1163.	_
6.	SIR (IF) PR	OJECT DOES NOT	OHALTEY) (STR	1=(5 · 1F)=	1.99	

\					i ·
	UNIT	LOCATION	LIGHTING	HRS FER DAY	DAILY
	TYPE		SAVINGS(W)	OPERATION	SAVINGS (KWH)
	20-17	L/R	180	6	1.080
		DIR	120	4	0.480
		BIRI	120	4	0.480
		BIR2	120	4	0.480
	·	B/R3	120	4	0.480
		BlR4	128	4	0.512
		BATH	40	4	0.240
		BATH 2	102	4	0.408
		KIT.	180	4	0.720
		LAUND	85	2:	0.085
		LANAI	320	6	1.920
; ;	TOTAL	:			
					6.885 KWH/PA
Assuming	7090 of the ANNUAL	lamps can be ENERGY S	AVINGS:		885 x .70 = 4.820
Assuming	709. of the ANNUAL	ENERGY S 4.820 km	AVINGS: H/DAY X 365 P AVINGS	PAJJyR = 1,75	885 x .70 = 4,820 9 KWH/yr
Assuming	709. of the ANNUAL	ENERGY S 4.820 km	AVINGS: H/DAY X 365 P AVINGS	PAJJyR = 1,75	885 x .70 = 4,820 9 KWH/yr
Assuming	709. of the ANNUAL	ENERGY S 4.820 km	AVINGS: H/DAY X 365 P AVINGS		885 x .70 = 4,820 9 KWH/yr
Assiming	ANNUAL ANNUAL ANNUA =	ENERGY S 4.820 km L COST S 1,759 kmH	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0.0	068 /kwH) = 1	885 x .70 = 4,820 9 KWH/yR
Assuming	ANNUAL ANNUAL ANNUA Cost for	ENERGY S 4.820 km L COST S 1,759 kmH	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0.0 ent Adaptor	068 /kwH) = 1,75 s (see alloched	885 x .70 = 4,820 9 KWH/YR 19.61 1): \$890
Assuming	ANNUAL ANNUAL ANNUA Cost for	ENERGY S 4.820 km L COST S 1,759 kmH	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0.0 ent Adaptor	068 /kwH) = 1,75 s (see alloched	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890 (.70) = 623
Assuming	ANNUAL ANNUAL ANNUA Cost for	ENERGY S 4.820 km L COST S 1,759 kmH	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0.0 ent Adaptor	068 /kwH) = 1,75 s (see alloched	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890 (.70) = 623
Assuming	ANNUAL ANNUA ANNUA Cost for	ENERGY S 4.820 km L COST S 1,759 kmH	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0.0	068 /kwH) = 1,75 s (see alloched	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890 (.70) = 623
Assuming	Tog. of the ANNUAL ANNUA Cost for Tog. of the Payba	ENERGY S 4.820 km L COST S 1,759 KMH or fluoresc Le lamps can ck = \$\frac{1}{4}\$	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0,0 ent Adaptor La replaced G23 19.61 Lyr	068/kwH) = 1,75 s (see alloched Total = = 5.2 yps	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890(.70)= 623
Assuming	Tog. of the ANNUAL ANNUA Cost for Tog. of the Payba	ENERGY S 4.820 km L COST S 1,759 kmH	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0,0 ent Adaptor La replaced G23 19.61 Lyr	068 /kwH) = 1,75 s (see alloched	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890(.70)= 623
Assuming	Tog. of the ANNUAL ANNUA Cost for Tog. of the Payba	ENERGY S 4.820 km L COST S 1,759 KMH or fluoresc Le lamps can ck = \$\frac{1}{4}\$	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0,0 ent Adaptor La replaced G23 19.61 Lyr	068/kwH) = 1,75 s (see alloched Total = = 5.2 yps	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890(.70)= 623
Assuming	Tog. of the ANNUAL ANNUA Cost for Tog. of the Payba	ENERGY S 4.820 km L COST S 1,759 KMH or fluoresc Le lamps can ck = \$\frac{1}{4}\$	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0,0 ent Adaptor La replaced G23 19.61 Lyr	068/kwH) = 1,75 s (see alloched Total = = 5.2 yps	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890(.70)= 623
Assuming	Tog. of the ANNUAL ANNUA Cost for Tog. of the Payba	ENERGY S 4.820 km L COST S 1,759 KMH or fluoresc Le lamps can ck = \$\frac{1}{4}\$	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0,0 ent Adaptor La replaced G23 19.61 Lyr	068/kwH) = 1,75 s (see alloched Total = = 5.2 yps	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890(.70)= 623
Assuming	Tog. of the ANNUAL ANNUA Cost for Tog. of the Payba	ENERGY S 4.820 km L COST S 1,759 KMH or fluoresc Le lamps can ck = \$\frac{1}{4}\$	AVINGS: H/DAY X 365D AVINGS Lyr X (\$0,0 ent Adaptor La replaced G23 19.61 Lyr	068/kwH) = 1,75 s (see alloched Total = = 5.2 yps	885 x .70 = 4,820 9 kwH/yR 19.61 1): \$890 890(.70)= 623

EDRIC D. O. CHONG & ASSOCIATES, INC.
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Telephone (808) 847-6557 Telefax: (808) 847-6550

Control of the second s

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-28

Fluence, Adapter 16 24 0.15 0.30 58.22 Fluence, Adapter 16 24 0.15 1.05 Fluence, Adapter 16 24 0.15 1.05 Fluence, Adapter 16 24 0.15 1.05 Fluence, Adapter 16 24 0.15 2.40 Fluence, Adapter 16 24 0.15 2.40 Pelsa Liabtor (524-57 44) (6.2bby 36 1 amon)	ABOR RATE: \$ 21,81 + 75%.	81+75	7,18		38.	SAY	7 438	Ġ				
Marie Januarity Marie Cost Co	PROJECT Kiplage Incadestrate	-1 ab+5					ESTIMATOR	CHE	CKED BY	SHEET	OF	S
Appen 2 6A 0.15 0.30 58.2 11.46 18 36 47.5 Appen 1 6A 0.15 0.30 58.2 11.46 18 36 47.5 Appen 1 6A 0.15 2.40 4 91.68 22 352 443 Adapha 16 5A 0.15 2.40 4 91.68 22 352 443 Adapha 16 5A 0.15 2.40 4 91.68 22 352 443 Adapha 16 5A 0.15 2.40 4 91.68 89.04 Adapha 16 5A 0.15 2.40 4 91.68 89.04 Adapha 16 5A 0.15 2.40 4 91.68 89.04 Adapha 17 6A 0.15 2.40 4 91.68 89.04 Adapha 18 89.04 89.04 A		6	וודץ		ا د	ABOR		E 0	UIPMENT	¥	ATERIAL	
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1												
depho 7 & 0.15 1.05 #0.11 20 140 180. depho 16 & 0.15 2.40 \ 91.08 \ 22 352 443 10.15 2.40 \ 91.08 \ 22 352 443 10.15 2.40 \ 91.08 \ 80.15 2.40 10.15 2.40 \ 91.08 \ 80.15 2.40 10.15 2.40 \ 91.08 \ 80.15 2.40 10.15 2.40 \ 91.08 \ 80.15 2.40 10.15 2.40 \ 91.08 \ 90.15 2.40 10.15 2.40 2.40 10.15 2.40 2.40 1	Fluores.	7	73	0.15	0.30	58.2	1			8/	3%	47.46
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16 EA O.15 2.40 \$ 91.63 22 352 443 100.11.5	Flus HS.	7	\$	0.15	1.05		11.04			2	140	180.11
16 EA O.15 2.40 \$ 91.68 22 352 443 100.15 24.90 \$ 91.68 22 352 443 201.30 \$ 50.15 2.49 201.30 \$ 67.50 201.												
5ubhtil (77) (71.7) (71	Flustes.	2/	£4		2.40	\rightarrow	91.68			22	S	443.68
Subtrit (107) (71.7) Subtrit (107) (71.7) Profit (107) (71.7) O/H (152) (10.7) Tox (47.1) 33. Sold (17.6) 891. (524-3144) (524-3144)							•					
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ot w/ (152) 110.						•			Prof.	\subseteq		67.13
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ot. ul									l	(4.7		33.97
رد سر (المجادة المجا									Bond	2		8.83
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LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

	T10#:		REGI				
PROJ	ECT TITLE	Replac	e Incades UNIT TYPE	ant Ligh	ts FIS	CAL YEAR	
DISC	RETE PORT	ION NAME	JNIT TYPE	20-11			
ANAL	YSIS DATE		ECO	HOMIC LIFE	25 YEAR	S PREPARED BY	
	B. SIOH C. DESIG D. ENERG C. SALVA	RUCTION COS) 7~) LC (1A+1B+1C) EXISTING EQU	X.9 IPMENT	\$	23 34,27 22.30 647.61 \$_647	. G1
		VINGS (+) / DATE ANNUAL	COST (-) SAVINGS, UNI	T COST \$ DI	SCOUNTED SA	VIHGS	
	FUEL	T203 \$/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)	
	A. ELEC B. DIST C. RESID D. NG E. COAL	\$	6.00 Junit	\$ 119.61 \$ \$ \$ \$		\$ 1,450. \$ \$	
	F. TOTAL			\$		\$ 145°	ک
3.	Λ. ΛΝΝUΑ (1)	L RECURRING DISCOUNT F/	+) / COST (-) i (+/-) iCTOR (TABLE) SAVING/COST (\$_ \$_	<u></u> 0	
	B. NON FITEM	RECURRING SA SAVINGS COST \$	VAINGS (+) \ C	COST (-) NR OF E RRENCE(2) F	DISCOUNT FACTOR (3)	DISCOUNTED INGS (+) COS) SAV- ST(-)(4)
	۲٠	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$				\$ \$ \$ \$	
	C. TOTAL	L NON ENERG	Y DISCOUNTED	SAVINGS (+)	/ COST (-)	(3A2+3Ba4)	<u> </u>
	(1) 25% i a. b. c.	MAX NON ENC IF 301 IS = IF 301 IS IF 3016 IS	RGY QUALIFICA' RGY CALC (2F5 OR 3C GO 3C CALC = 1 GO TO I 1 PROJECT D	X .33) TO ITEM 4 SIR = (2F5 TEM 4		\$ <u>'478.5</u>	ව
4.	FIRST YE	AR DOLLAR S	AVINGS 2F3+3A	+(3B1d : Yf.	ARS ECONOMI	LIFE) \$ 11	9.61
5.	TOTAL NE	T DISCOUNTE	D SAVINGS (2F	5+3C)		s <u> 145</u>	70
6.	SIR (1F	1 PROJECT	DOES NOT OUA	LIFY) (SIR)	=(5 : 1F)=	2.24	

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CEDRIC D. O. CHONG & ASSOCIATES, INC
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Telephone (809) 847-6557 Tolotay: (808) 847-655

DATE:	JOB M	o.:	
PROJECT NAME:		BY:	_
SUBJECT:		Sht. 3-37	

MO. OF UNITS	escent Lights QUANTITY NO. OF UNIT UNITS MEAS	T I HAY	TOTAL HRS	UNIT	COST	UNIT PRICE	CHECKED BY EQUIPMENT NIT COST	SHEET MA UNIT PRICE	MATERIAL COST	TOTAL
7	. 4	0.15	0,30	28.7	11.64			8/	36	47.64
 	\$	0.15	6.0		34.38			3	120	154.38
7	£A	0.15	 8.	\rightarrow	68.76			22	240	308.76
							Subhe	7		510.78
				•	,		Profit	(10%	(51.08
							п/о	(152	(84.28
_							Tax	(47.		25.85
							Bond	(19)		6.72
							Tatal			(078,70)
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LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCA	: R01T/	REGION NO.	PROJECT NUM	1BER
PROJ	ECT TITLE Repla	ce Incadescent L UNIT TYPE 20-1	ights FIS	SCAL YEAR
ANAL	YSIS DATE	ECONOMIC L	IFE 25 YEAR	RS PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION CO B. SIOH (5.57) C. DESIGN COST (10) D. ENERGY CREDIT CO E. SALVAGE VALUE CO F. TOTAL INVESTMENT	。) o 7。) CALC (1A+1B+1C)X.9 OF EXISTING EQUIPMENT	\$	76 26.18 47.60 494.80 \$_494.80
?.	ENERGY SAVINGS (+) ANALYSIS DATE ANNUA	/ COST (-) NL SAVINGS, UNIT COST	\$ DISCOUNTED SA	AVINGS
	FUEL \$/MBTU(1)	SAVINGS ANNUAL MBTU/YR(?) SAVINGS	(3) FACTOR(4)	SAVINGS(5)
	A. ELEC \$19.93 B. OIST \$ C. RESID \$ D. NG \$ E. COAL \$	4.280 unit \$ 85.		\$ \$ \$
	F. TOTAL	\$ 85.0	08	\$ 1031
3.	NON ENERGY SAVINGS A. ANNUAL RECURRIN (1) DISCOUNT (2) DISCOUNTED		\$_	0
	ITÉM SAVINO	SAVINGS (+) / COST (-) GS \$ (+) YEAR OF \$ (-)(1) OCCURRENCE(2	OISCOUNT	OISCOUNTEO SAV- INGS (+) COST(-)(4)
	a. \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$			\$ \$ \$ \$
	C. TOTAL NON ENER	GY DISCOUNTED SAVINGS	(+) / COST (-)	(3A2+3Ba4) \$ <u>0</u>
	(1) 25% MAX NON EN a. IF 3D1 IS b. IF 3D1 IS c. IF 3D1b IS	ERGY QUALIFICATION TEST CRCY CALC (2F5 X .33) = OR	4 (2F5+3D1) : 1F	\$ 340.23
4.	FIRST YEAR DOLLAR	SAVINGS 2F3+3A+(3B1d	: YEARS ECONOMI	C LIFE) \$ 85.08
5.	TOTAL NET DISCOUNT	ED SAVINGS (2F5+3C)		\$ 1031
6.	SIR (IF 1 PROJEC	T DOES NOT QUALIFY) (SIR)=(5 : 1F)=	2.08

.7	//:!:=	1	ATION	1111	ITI-II	ا الم	Don Dave	TA 11 14	· · · · · · · · · · · · · · · · · · ·
	UNII TYPE			LIGH			PER DAY RATION	SAVINGS (кт.
1	7 // 5	: :				1 1	ATTION	21/1/1/25	
	32 -I		4R		45		6	0.270	
ŧ	32 - II			:	: :	;			· · · · ·
							0		
Assuming	only 70	% of t	Le la	ps cr	n he re	placed	Total	= 0.270(.70) = 0.18
	ANNU	AL ZI	UERGO	SAVIO	165 1-	21-1	244/	= 0.270(.70	
		, = . (J./87	1,7007	/Day x	305°	7/9R -	_68.97	IR.
								emanda a madada a a jiri a	
	7//9/9/	= (68.99	KWH/u	e × (\$	0.00	8 /KWH) = 4.69	
	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)				Commercial Care				
	Cost	for:	Fluor	escent	Adap	lo- =	# 37	00	*******
	Csee	aHa	ched)	Adap.				
Assuming	only 70	2 of 14	- lamps	con be	replace	07	otal = 3	7.00 x .70 = 25.	70
	Payl	oa,ck.	<u> </u>	25.9	0	<u> </u>	5.5	7.00 x .70 = 25.	
			: \$\$	4.6	9 /4R		•	-	
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CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 96819
Telephone (808) 847-6557
Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-34

	OF 5		TOTAL				2 27.73		27.73	2.77	4.58	٠ - ١	0.36	36.85		\$ 37.00								
		MATERIAL	r cost				7			107)	(6.	7	2			SAY	\ 						·	_
	SHEET		PRICE	8/	3	_	22		ا ا		\vdash	(17)	(19	_						 _				
	снескей ву	EQUIPMENT	COST						3,44.2	, —	0/11	,	Bond	Total										
3.20	CHE	E C	PRICE											-										
438.20	ESTIMATOR		C03T	0	0		5.73	٠																
SAY		ABOR	UNIT	58.2			\rightarrow			•														
38.			TOTAL HRS				0.15																	
11			AH	0.15	0.15		0.15																	
1% LB		TITY	UNIT	£.	\$		£4								٠									
31 + 75	ights	U QUANTII	NO. OF UNITS	0	0		,											(**						
480R RATE: \$21.81+75%.	Incadescent Li		Unit TUBE 32 -I & II	quo Fluores. Adapho	11W Fluencs. Adopha	- 1	15W Flustes, Adapta									NOTE:	a) Mat'l cost anote ul	6 Lighting (524-37	1 Glomon)		•	•		

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCA	TION: REGION NO PROJECT NUMBER
PROJ	ECT TITLE Replace Incadescent Lights FISCAL YEAR
DISC	RECT TITLE Replace Incadescent Lights FISCAL YEAR UNIT TYPE 32-IO & 32-II
ANAL	YSIS DATE ECONOMIC LIFE 25 YEARS PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) D. ENERGY CREDIT CALC (1A+1B+1C)X.9 E. SALVAGE VALUE OF EXISTING EQUIPMENT F. TOTAL INVESTMENT (1D-1E) \$ 25.90 \$ 2.59 \$ 26.92
	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT COST \$ DISCOUNTED SAVINGS
	COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
	A. ELEC \$ 19.94 0.235/unit \$ 4-69 12.12 \$ 56.84 B. DIST \$ \$ \$ \$ \$ \$ C. RESID \$ \$ \$ \$ \$ D. NG \$ \$ \$ \$ \$ E. COAL \$ \$ \$ \$ \$
	F. TOTAL \$ 4.69 \$ 56.84
3.	MON ENERGY SAVINGS (+) / COST (-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE 1) (2) DISCOUNTED SAVING/COST (3A X 3A1) \$ O
	B. NON RECURRING SAVINGS (+) / COST (-) ITEM SAVINGS \$ (+) YEAR OF DISCOUNT DISCOUNTED SAV- COST \$ (-)(1) OCCURRENCE(2) FACTOR (3) INGS (+) COST(-)(4)
	a.
	C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bo4) \$
	D. PROJECT NON ENERGY QUALIFICATION TEST (1) 25% MAX NON ENERGY CALC (2F5 X .33) a. IF 3D1 IS = OR
4.	FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d : YEARS ECONOMIC LIFE) \$ 4.69
5.	TOTAL NET DISCOUNTED SAVINGS (2F5+3C) \$ 56.84
6.	SIR (IF) PROJECT DOES NOT QUALIFY) (SIR)=(5: 1F)= 2.11

λ : λ					
	UNIT	LOCATION	LIGHTING	HRS PER DAY	DAILY
2 10 10 10 10 10 10 10 10 10 10 10 10 10	TYPE		SAVINGS(W)	OPERATION	SAVINGS (KWH)
	32 <i>-1</i> II	LIR	180	6	1.080
		DR	320	4	1.280
		BIRI	180	4	0.720
		BlR2	120	4	0.480
		BIR3	180	4	0.720
		HAIDS	128	4	0.512
		BATH	45	4	
		BATH 2			0.180
			45	4	0.180
		KIT.	60	4:	0.240
		LAUND.	256		0.512
		LANALL	60	6	0.360
		LANAI 2	. 120	2	0.240
	TOTAL			=	6.504 KWH/Day
Assuming or	\	/l. · · · · ·	2	ced Total = .	70 (6.54) = 4,553
A	ANNICA	L ENERGY		Donel	- FOH/
		4.533 ~	-7/Pay & 365	- Days/yr = 16	62 Rolly 9R
	4				
	ANNUA	L Cost X	Lyinas	.068 lyr)=	#
		1,462 1	04/98 × (# C	1,000 lyr)=	
	Cost +	or Hubrey	scent Adapt	ors = \$ 100	<u> </u>
	(see	attached)			
Assuming.		of the lang		placed Total	= (1000 x.7.) = 700
0	Payba	ck • 4	700	_ = 6.2	- JAS
		41	13 /yr		<i>V</i>
			· · · · · · · · · · · · · · · · · · ·		
	SIR =	1.88		(see attach	ed)
					! :

EDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawall 96819 Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-37

	S		TOTAL			283.03	471.41			754.44	75.44	124.48	38.17	9.93	1,002.47		000/								
	P	MATERIAL	созт			220	374										SAY #	\							
	SHEET	*	UNIT PRICE		8/	2	22			ح	(107	(15%	(47.	(1%											
1	CHECKED BY	EQUIPMENT	COST							34475	Prof.t	п/о	· >&/-	Band	Total								• .		
d	CHE	E01	PRICE																						
438	ESTIMATOR		C03T		0	63.03	14.79	•												·				·	
SAY		LABOR	UNIT		58.2		>		•							٠									
38.		اد	TOTAL HR3			1.65	2.55																		
- 8			MH		0.15	0.15	0.15																		
7.18		TITY	UNIT		EA	3	£A									٠									
31 + 75	Lights	QUANTI	NO. OF UNITS		0	//	17												(44)						
	Incadescent		TASK DESCRIPTION Unit TUBE 32-1正	.0	que Fluores. Adapta	11W Flue HS. Adopha	15W Flushes. Adapta										NOTE:	a) Hat'l cost quote wl	- (4	(Glomon)	D	•			TENOT AND AND AND THE

LOCA	ATION:		REG	10N NO	PROJECT NU	MBER
PROL	ECT TITLE	Replace	Incade	scent Lia	hts FI	SCAL YEAR
D150	CRETE PORTION	NAME UA	VIT TYPE	E 32-10	<u>t</u>	SCAL YEAR
						RS PREPARED BY
١.	INVESTMENT CO A. CONSTRUCT B. SIOH (5 C. DESIGN CO D. ENERGY CH E. SALVAGE V F. TOTAL INV	OSTS TON COST S.5%) OST (16% EDIT CALC VALUE OF EVESTMENT (OSS (+) / C	(1A+1B+1C XISTING EQ 1D-1E))X.9 UIPMENT	\$_70 \$	\$ 727.65
	ANALYSIS DATE		•			
	FUEL \$/h	18TU(1) M	BTU/YR(2)	SAVINGS(3)	FACTOR(4)	DISCOUNTED SAVINGS(5)
	A. ELEC \$\frac{1}{6}\$. DIST \$\frac{1}{6}\$. RESID \$\frac{1}{6}\$. NG \$\frac{1}{6}\$. COAL \$\frac{1}{6}\$.	1.92 S	.com/unt	\$ 1/3 \$ \$ \$ \$	12.12	\$ 1370. \$ \$ \$
	F. TOTAL	_		\$ 113.	<u>.</u>	\$ 1370
3.	A. ANNUAL RE	CURRING (+/-) OR (TABLE		<u> </u>	0
	B. NON RECUI	SAVINGS \$	(+) YE	AR OF	DISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a b c	\$\$ \$\$				\$ \$ \$ \$
			_	SAVINGS (+)) / COST (-)	(3A2+3Ba4) \$ O
	(1) 25% MAX I a. 1F 30 b. 1F 30 c. 1F 3	NON ENERCY DI IS = OR DI IS = 30 DIb IS =	3C GO CALC 1 GO TO 1	5 X .33) TO ITEM 4 SIR = (2F		\$ <u>452.10</u>
4.	FIRST YEAR D	OLLAR SAVI	INGS 2F3+3/	.+(3B1d : YI	CARS ECONOMI	c Life) \$ 1/3
٥.	TOTAL NET DI	SCOUNTED :	SAVINGS (2F	·5+3C)		1370
6.	SIR (IF)	PROJECT DE	DES NOT OU	ALIFY) (SIR)=(5 : 1F)=	1.88

		,			
		ation LIGHTI			/ \
,	TYPE	SAVINI	GS(W) OPERA	mon SAVIN	165 (KWH)
	32-IV LIF	2 60		0.360	·
	D/			t 0.960	
		Z1 /80		t 0.72	
		R2 121		+ 0.480	_
		23 /2		1 0.480	
		R4 192		4 0.768	
		+ID'S /25		t 0.512	
		THI 6		1 0.240	
		4TH2 6	0	1 0.240	
	K	IT. 12	o :	F 0.480	
		4UND. 121	0	2 6.240	• • • • • • • • • • • • • • • • • • • •
	L	ANAL 5	0 : (0.300	<u> </u>
	TOTAL				KWH/Day
Assuming	y 70% of the 1.	mps can be reg	placed Total	= 5.780 (70) -	4.046
	ANNUAL E	NERGY SAVIN	65	KWH	
	= . (1.046 ~ Da	× 365 -	1477 KWH	y
	ΔλιλΙΔΑ	ost SAVINI			
	A107007.2	23) <u>ΣΛ</u> V(Ν)	X (\$ 0.069	3 /kwH) = \$	100.44
		1.7-11-190	~ (10, 000	2/KWH) - P	
	Cost for	Fluoresch	Adamtes =	\$ 945,00	
	(see affa)	fluores cont	7.03.03.10		
Assumia				J = .70/945) =	((150
	Payback	- \$ 66	1.50 =	6.6 URL	
		\$ 100	.44 /ur	0	
	1.0-	77 (se	e attached		:
	DIR - 1				
	PLA				
	DL				

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DATE:	JOB No	•:
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-40

PROJEC Keelage Incadestal L.	421,81+157	7.18	μ .	38	SAS	ESTIMATOR	,	CHECKED BY	SHEET	OF	TS
	J QUANTI	TITY		۲	LABOR		EQ	EQUIPMENT	ì	MATERIAL	
Unit Tube 32-TE	NO. OF UNITS	UNIT MEAS	MH	TOTAL HRS	UNIT	COST	PRICE	COST	UNIT	COST	TOTAL
9w Fluores, Adapho	0	£4	0.15		58.2	0			18		
11W Flus HS. Adapha	72	\$	0,15	0.75		28.65			2	/00	128.65
- 1											
15W Flucks. Adapto	2/	£4	0.15	3.15	\rightarrow	120.33			22	462	582.33
						٠					
					•						
								उपमार	9		710.98
					•			Profit	(10%)	71.10
								о/н	(15%)	117.31
								Tax	(47.	(35.98
								Bond	(196		9.35
						-					
							-	Total		,	944.72
		-			·						
NOTE:										8 MAS	945.00
a) Mat'l cost quote ul											
(4	(74)										
ر لمصم											
)											
		·									
•											
						·					
DA FORM 5418-R, Apr 85 CONTD	•										

	CATION:			
PRO	DJECT TITLE Replace Inco	edescent Lia	hts Fis	CAL YEAR
0150	OJECT TITLE <u>Replace Inco</u> SCRETE PORTION NAME UNIT-	TYPE 32-IV		
ANAI	ALYSIS DATE	ECONOMIC LIFE	25 YEAR	S PREPARED BY
1.	INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) D. ENERGY CREDIT CALC (1A+1) E. SALVAGE VALUE OF EXISTIN F. TOTAL INVESTMENT (1D-1E)	IB+IC)X.9 IG EQUIPMENT)		61.50 36.38 66.15 687.63
2.	ENERGY SAVINGS (+) / COST (- ANALYSIS DATE ANNUAL SAVINGS		ISCOUNTED SA	AINCZ
	COST SAVING FUEL \$/MBTU/YI			
	A. ELEC \$ 19.93 5.041/B. OIST \$	unit \$ 100.44		\$
	F. TOTAL	\$ 100.44	•	\$ 1217
3.	NON ENERGY SAVINGS (+) / COM A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TA (2) DISCOUNTED SAVING/	ABLE 1)	\$_ \$_ \$_	, O
	B. NON RECURRING SAVINGS (- ITEM SAVINGS \$ (+) COST \$ (-)(1)	YEAR OF	DISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a \$ b \$ c \$ d. TOTAL \$			\$ \$ \$
	C. TOTAL NON ENERGY DISCOU	NTED SAVINGS (+)) / COST (-)	(3A2+3Bo4) \$ C
	D. PROJECT NON ENERGY QUAL (1) 25% MAX NON ENERGY CALC a. IF 3D1 IS = OR 3 b. IF 3D1 IS 3C CALC c. IF 3D1b IS = 1 G0 d. IF 3D1b IS 1 PROJ	IFICATION TEST (2F5 X .33) C GO TO ITEM 4 SIR = (2F5) TO ITEM 4	5+3D1) : 1F =	s 401.G1
4.	FIRST YEAR DOLLAR SAVINGS 2	PF3+3A+(3B1d: YI	CARS ECONOMI	LIFE) \$ 100.44
5.	. TOTAL HET DISCOUNTED SAVING	S (2F5+3C)		\$ 1217
6.	. SIR (IF 1 PROJECT DOES NO	T OUALTEY) ISTR)=/5 ·)F)=	177

	UNIT	LOCATION	LIGHTING	HRS FER DAY	DAILY
	TYPE		SAVINGS(W)		SAVINGS (KWH)
	57-I	LIR	320	6	1.920
		DIR	. 120		0.480
		BIRI	120	4	0.480 0.240
	· · · · · · · · · · · · · · · · · · ·	BIRZ KIT.	240	4	0.960
4		Laund.	120	2	0.240
)		Bath	128	4	0.512
	TOTAL				= 4.832 KWH/Dmy
Assuming the	Lonly 700	7 of the lan	ps can be re	placed Total	1 = 4.832 (,70)
)	ANNUA	L ENEKGY	~7WANWG7		-: 3,382
		3.382 KL	1H/Day x (36	5 Dows/yr) =	1234 KWH/gr
			. J		
	ANNUA	L COST SAL	11NGS		
	·	1234 264	/yR × (#0,	068 /KWH).	₹ \$ 83.91
	Cucli	PI	- 0 1	- = # ///-	
<u> </u>	$\frac{1}{2}$	attached)	er adaph	r = \$ 645	
Ascussias			ame em be	renlace 1 To	tal = .70(645) = 451.
Assuming	Pairba	ck = \$	451.50	= 5.4	100 673) = 127.
	J	\$	83.91 Jyr	= 5.4	<u>0</u>
			J.		· · · · · · · · · · · · · · · · · · ·
	SIR =	2.17		(see attai	ched)
				,	
					
					·
				; ;	
					The second of th
	<u> </u>				
				<u> </u>	

EDRIC D. O. CHÓNG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawali 96819 Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.	•	
PROJECT NAME:		BY:	
SUBJECT:	······································	Sht.	3-4:3

LOC/	CATION:REG	ION NO	PROJECT NUM	BER
PROJ	OJECT TITLE Replace Incade	scent Ligh	nts FISC	CAL YEAR
DISC	OJECT TITLE <u>Replace Incade</u> SCRETE PORTION NAME UNIT TYP	E 57-I 0		
ANAL	ALYSIS DATEEC	ONOMIC LIFE	25 YEARS	S PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (5 5%) C. DESIGN COST (10%) D. ENERGY CREDIT CALC (1A+1B+1C) E. SALVAGE VALUE OF EXISTING ECO F. TOTAL INVESTMENT (10-11)	PMENT	\$ 4	1.50 4.83 5.15 .9.33 4.69.33
?.	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UN		SCOUNTED SAY	VINGS
	COST SAVINGS FUEL \$/MBTU(1) MBTU/YR(?)	(E)2DHIVAZ	FACTOR(4)	SAVINGS(5)
	A. ELEC \$ 19.92 4.212/un. B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	F\$ 83.91		\$
	F. TOTAL	\$ 83,71		5 1017
3.		1)	\$_ \$_	<u>o</u>
	B. NON RECURRING SAVINGS (+) / ITEM SAVINGS \$ (+) YI COST \$ (-)(1) OCC	COST (-) EAR OF !! JRRENCE(2)	DISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a\$ b\$ c\$			\$ \$ \$
	C. TOTAL NON ENERGY DISCOUNTED	SAVINGS (+)	/ COST (-)	(3A2+3Ba4) \$ <u>O</u>
	D. PROJECT NON ENERGY QUALIFIC (1) 25% MAX NON ENERGY CALC (2F a. IF 301 IS = OR 3C GO b. IF 301 IS 3C CALC c. IF 301b IS = 1 GO TO d. IF 301b IS 1 PROJECT	5 X .33) TO ITEM 4 SIR = (2FS ITEM 4	+3D1) : 1F =	<u>\$ -335.61</u>
4.	. FIRST YEAR DOLLAR SAVINGS 2F3+3	Λ+(3B1d : ΥΠ	ARS ECONOMIC	LIFE) \$ 83.91
5.	. TOTAL HET DISCOUNTED SAVINGS (?	F5+3C)		s 1017
6.	. SIR (IF) PROJECT DOES NOT QU	ALIFY) (SIR)	=(5 : 1F)=	2.17

UNIT		LIGHTING	HRS PER DAY	PAILY
TYPE		SAVINGS(W)	OPERATION	SAVINGS (KWH)
57-II	L/R	180	6	1080
14 57-W		60	4	1.080 0.240
\$ 57-VI		60	4	6.240
\$ 57-VII		60	4	6.240
\$ 57-IX		75	4	0.300
	LAUND.		2	0.120
TOTA				= 2,220 KwH/Day
Assuming that only		lamps can be r	eplaced Total	
DANNE			and any commence of a second service.	
	= 1.554	KWH/Day × 36	5 Pm/yr = 50	7 KuH/yr
	·			
ANNI	UAL COST.	SAVINGS		
	= 567 KG	Hlyrx (\$0.	068 KUH)	<u>-</u> 438.56
			H 20	
Cost	tor fluor	escent adapt	W = 4 3/0	
See (See	attached.)		1 1710.	7. (270) 5 3 5 6
Posuming that only	10% c/ = \$	mps com se rep	12 cm 10 tul-	10 (3!9) = 25 7
[Paux H	43.1		1 4 0 0
	· ; ; \$\$	38.56		
	***************************************	38.56	ye	
SIR	± 1.73	38.56		.70 (370) = 259 yrs hed)
SIR	± 1.73	38.56	ye (see affac	1 1 1
SIR	± 1.73	38.56		1 1 1
SIR	= 1.73	38.50		1 1 1
SIR	± 1.73	38.56		1 1 1
SIR	± 1.73	38.56		1 1 1
SIR	= 1.73	38.56		1 1 1
SIR	± 1.73	38.50		1 1 1
SIR	= 1.73	38.56		1 1 1
SIR	= 7.73	38.56		1 1 1

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CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawali 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:	•	BY:
SUBJECT:		Sht. 3-46

	ANIT HAS PRICE	TOTAL
28.2		0.15
	51.5	£A 0.15
5.7	.15 /.	
1		
_		

LOCATION:	REG	ION NO P	ROJECT NUMB	ER
PROJECT TITLE	Replace Incades	cant Light	ts FISC	AL YEAR
DISCRETE PORTI	Replace Incades	E 57-II , OII		IF , 🔀
ANALYSIS DATE	ECC	ONOMIC LIFE _	25 YEARS	PREPARED BY
B. SIOH C. DESIGN D. ENERGY	COSTS UCTION COST (5.5%) COST (10.7°) CHEDIT CALC (1A+1B+1C E VALUE OF EXISTING EQUINVESTMENT (1D-1E))X.9 UIPMENT	\$ 25° \$ 44 \$ 25 \$ 26° \$ -	1. .,25 .,90 1.24 \$
	INGS (+) / COST (-) ATE ANNUAL SAVINGS, UN		COUNTED SAV	INGS
	COST SAVINGS \$/MBTU(1) MBTU/YR(2)	SAVINGS(3)	FACTOR(4)	SAVINGS(5)
A. ELEC B. DIST C. RESID D. NG E. COAL	\$ 19.93 1.935 unit \$ \$ \$	\$ 38.56		1
F. TOTAL		\$ 38.56		s 467:35
A. ANNUAL	SAVINGS (+) / COST (- RECURRING (+/-) DISCOUNT FACTOR (TABLE DISCOUNTED SAVING/COST	1)	\$_ \$_	0
B. NON RE ITEM	COURRING SAVINGS (+) / SAVINGS \$ (+) YE COST \$ (-)(1) OCCU	COST (-) AR OF DI IRRENCE(2) FA	SCOUNT ACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
a b c	\$ \$			
	NON ENERGY DISCOUNTED	SAVINGS (+)	/ COST (-)	(3A2+3Ba4) \$ O
D. PROJEC (1) 25% M. a. 11 b. 17 c. 11	CT NON ENERGY QUALIFICA AX NON ENERGY CALC (2FS F 3D1 IS = OR 3C GO F 3D1 IS 3C CALC F 3D1b IS = 1 GO TO 1 F 3D1b IS 1 PROJECT I	ATION TEST 5 X .33) TO ITEM 4 SIR = (2F5+: ITEM 4	: 3D1) : 1F =	154.23
4. FIRST YEA	R DOLLAR SAVINGS 2F3+3/	1+(3B1d : YEA	RS ECONOMIC	LIFE) \$ 38.56
5. TOTAL NET	DISCOUNTED SAVINGS (28	F5+3C)		\$ 467.35
6. SIR (IF	1 PROJECT DOES NOT QUA	ALIFY) (SIR)=	(5 : 1F)=	1.73

	UNIT LOCAT	ION LIGHTING	HRS PER DAY	PAILY
		SAVINGS(W)	OPERATION	SAVINGS (KWH)
	57-II UR		6	1.080
	BlR BlR		4	0.180
	B/R		4	0.240
	Lau		2	0.120
	TOTAL		=	1.860 KWH/Da
Assuming that	only 709.07 W	e lamps can be req	laced Total.	,70 (1.860) = 1.302
0	ANNUAL ENE	RGY SAVINGS	D. 1	me KraH I
	= 1.362	RGY SAVINGS EWH/Pay x (365	19rl = 7	15 - 17 R
	ANNUAL COS			
	= 475	KWH/yR x (\$ 0.0)68 /kWH) =	# 32.30
	i de la compansión de la La compansión de la comp			
	Cost for Hu	ore scent adaptor	c = 4 260	.00
Assumin: 7	(Sec affacher	the lange on he	realer Tate	l = .70/260) = 182
	Payback = _	th larger con he \$ 182. \$ 32.30 lyr	_ = 5.6 yr	
		\$ 32.30 /yr		
	and a second after the contract of the contrac	ar ke garan ne adine aran je ar ar reĝe er re eg e er ar geralande.	annengia ara i ana marana mangka arangka	man, a
	SIR = 2.06		(see allach	ed)
		,		
				· · · · · · · · · · · · · · · · · · ·
				<u></u>
				manus de la capación
			1	

EDRIC D. O. CHONG & ASSOCIATES, INC.
CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawaii 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:		
PROJECT NAME:		BY:	
SUBJECT:		Sht.	3-49

	TS		TOTAL				11.7461		11 44.11	14.41	32.03	9.82	2.55		257.92	260,00								
	O.	MATERIAL	COST				154			((SAY								
	SHEET	M	UNIT		81	2	22	·	4	(10)	(15%	(47.	(19%											
	CHECKED BY	EQUIPMENT	COST						the s	Profit	н/о	18x .	Bond		Total							•		
3	CHEC	EQ	UNIT									,												
4,38.20	三		COST				40.11	•						·					•					
SAS		ABOR	UNIT		58.24		→			•														
S		Ļ	TOTAL HRS		0	0	50.1																	
. 38			TIMO/		0.15	0,15	0.15																	
% LB		TITY	UNIT		EA	£A	£A																	
31 + 75	Lights	J QUANTITY	NO. OF UNITS		0	0	7											(**						
LABOR RATE: \$ 21.81 + 75%	Incades		Unit Tube, 57-III	0	quo Fluores, Adapho	11W Fluence. Adoph	15W Flushes Adapto									NOTE:	a) Mat'l cost quote ul	19in (524-57	1 (Glomon)		•			DA ECIDIA SAIR-D Ass BA CONTR

		REGION NO.		
PROJ	RETE PORTION NAME UNIT	descent Lig	hts Fis	CAL YEAR
DISC	RETE PORTION NAME UNIT	19PE 51-11	<u>. </u>	
ANAL	YSIS DATE	_ ECONOMIC LIFE	25 YEAR	S PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10.7%) D. ENERGY CREDIT CALC (1A+1) E. SALVAGE VALUE OF EXISTIN F. TOTAL INVESTMENT (1D-1E)	IC EQUIPMENT	2	32 10.01 18.20 89.19
?.	ENERGY SAVINGS (+) / COST (- AMALYSIS DATE ANNUAL SAVINGS		ISCOUNTED SA	VINGS
	FUEL \$/MBTU(1) MBTU/YI		FACTOR(4)	SAVINGS(5)
	A. ELEC \$ 19.93 / .624/ B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	unit \$ 32.20		\$ 390.26 \$ \$ \$
	F. TOTAL	\$ 32.20		\$ 390.26
3.	NON ENERGY SAVINGS (+) / CO A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (T. (2) DISCOUNTED SAVING/	ABLE 1)	\$_ \$_	0
	B. NON RECURRING SAVINGS (ITEM SAVINGS \$ (+) COST \$ (-)(1)	+) / COST (-) YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a. \$ b. \$ c. \$ d. TOTAL \$			\$ \$ \$ \$
	C. TOTAL NON ENERGY DISCOU	NTED SAVINGS (+)	/ COST (-)	(3A2+3Ba4) \$ O
	D. PROJECT NON ENERGY QUAL (1) 25% MAX NON ENERGY CALC a. IF 3D1 IS = OR 3 b. IF 3D1 IS 3C CALC c. IF 3D1b IS = 1 G0 d. IF 3D1b IS 1 PROJ	(2F5 X .33) C GO TO ITEM 4 SIR = (2F5 TO ITEM 4		\$ 128.79.
4.	FIRST YEAR DOLLAR SAVINGS 2	F3+3A+(3B1d: YF	CARS ECONOMIC	LIFE) \$ 32.20
5.	TOTAL NET DISCOUNTED SAVING	(2F5+3C)		\$ 390.26
6.	SIR (IF) PROJECT DOES NO	T QUALIFY) (SIR)	=(5 : 1F)=	2.06

\land						
	UNIT	LOCAT	ion Ligi	HTING	HRS PER DAY	PAILY
	TYPE				OPERATION	SAVINGS (KWH)
	57-Y			180	6	1.080
	\$ 57-VI			60	4	6.240
		BIR		60	4	0.240
*		LAUN	10. : : :	60	2	0.120
Ascumia.	that ml	70% of t	Le lange	ca be	. 1 . 1 . 7.1	= 1.680 KWH/D
<i>(</i> 19304)	ANNI	JAL ENE	RGG CA	VINGS	pieces	l = 1.(80 (.70) = 1.176 kw// 129 kwH/yr
		= 1.176	KWH/Day	× (365)	Day/ye) =	129 KuH/yr
		. 4		· · · · · · · · · · · · · · · · · · ·		
	ANNI	IAL COS	T SAVI	NGS	68 lye)	_#
		= 429	RWH/YR	× (\$0.0	68 lyp)	= 29.17
A TOTAL PROPERTY OF A PARTY OF A						
	(coc)	itor + lu	o rescunt	adaptor	_ =	
A Ssumin	that only	702 4 the	lance	he resta	el Total	= 220(70) = \$15
	Pay	back =	\$ 15	4	= 5.3	urs
	ن		H - A			Yı =
			4 29	.17 /y	٤	J
			\$ 29	.17 /y	Paranta ang atau atau atau atau atau atau atau ata	= 220(70) = \$15
		= 2,20	J 27	.17 /y	e (see aff	
			B 27	.17 /y	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	17 /y	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	17 /y	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	.17 /y	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	17 / 1/36	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	17 / 1/36	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	17 / 1/36	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	17 / 18	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	17 / 4	Paranta ang atau atau atau atau atau atau atau ata	
			B 27	17 / 4	Paranta ang atau atau atau atau atau atau atau ata	

EDRIC D. O. CHONG & ASSOCIATES, INC.
CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:	BY:	
SUBJECT:	Sht.	3-52

LABOR RATE: \$21.81+	127 + 189	7.18	38	B	SAY	4 \$38.20	3.5				
	Lights					ESTIMATOR	CHE	CHECKED BY	SHEET	P.	TS
i	QUANTI	TITY		ر	ABOR		E Q	EQUIPMENT	ž	MATERIAL	
Unit Tube 57-12 9 VII	NO. OF UNITS	UNIT	TINY	TOTAL HRS	UNIT PRICE	COST	UNIT	COST	UNIT	COST	TOTAL
0.		•									
qw Fluors. Adaphon	0	EA.	0.15		58.2				18		
11W Fluence. Adopper	0	£4	0,15						2		
į							·				
15W Fluens. Adapta	9	£4	0.15	0.36	\rightarrow	34.38			22	132	166.38
						•					
								344.2	2		166.38
					٠			Prof.t	(10%		77.9/
								о/н	(15%		27.45
								Tax.	(47		8.42
								Bond	(19		2.19
						•					
								Total			221.08
NOTE:										544	\$ 220
a) Mat'l cost quote ul											
14	(++)										
(forman)	_					•					
P						10					
•											
DA FORM 5418-R, Apr 85 CONTO			 								

LOC/	TION: REGION NO PROJECT NUMBER
PROJ	CRETE PORTION NAME UNIT TYPE 57-ID, 57-VII
DISC	CRETE PORTION NAME UNIT TYPE 57-10,57-11
ANAL	YSIS DATE ECONOMIC LIFE 25 YEARS PREPARED BY
1.	INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) D. ENERGY CREDIT CALC (1A+1B+1C)X.9 E. SALVAGE VALUE OF EXISTING EQUIPMENT F. TOTAL INVESTMENT (1D-1E) \$ 154 \$ 160.08
2.	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT COST \$ DISCOUNTED SAVINGS
	COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
	A. ELEC \$ 19.92 1.464 unit \$ 29.17 12.12 \$ 353.54 B. DIST \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
	F. TOTAL \$ 27.17 \$ 353.54
3.	NON ENERGY SAVINGS (+) / COST (-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE 1) (2) DISCOUNTED SAVING/COST (3A X 3A1) \$ 0
	B. NON RECURRING SAVINGS (+) / COST (-) ITEM SAVINGS \$ (+) YEAR OF DISCOUNT DISCOUNTED SAV- COST \$ (-)(1) OCCURRENCE(2) FACTOR (3) INGS (+) COST(-)(4)
	a. \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
	C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Ba4) \$
	D. PROJECT NON ENERGY QUALIFICATION TEST (1) 25% MAX NON ENERGY CALC (2F5 X .33) a. 1F 3D1 IS = OR 3C GO TO ITEM 4 b. 1F 3D1 IS 3C CALC
4.	FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d : YEARS ECONOMIC LIFE) \$ 29.17
٥.	TOTAL NET DISCOUNTED SAVINGS (2F5+3C) \$ 353.54
6.	SIR (IF 1 PROJECT DOES NOT QUALIFY) (SIR)=(5: 1F)= 2.20

	UNIT		LIGHTING	HRS PER DAY	
	TYPE		SAVINGS(W)	OPERATION	SAVINGS (KWH)
	60-I	LIR	45	G	0.270
Assuming the	tonly	70 % m th	bolle con he	res/2 1 T	4-1 = 270×.70
71330-105	ANNUAL	LENERGY	SAVINGS	praw	= 0.189 KWH
	=	0.189	KWH/Pay x 345	Daylyr = C	tel=.270x.70 = 0.189 KWH 09 KWH/yr
and the same and t					
		69 KWH	SAVINGS //yr × (#0.0	68/ KwH) =	\$ 4.69
	(see o	Hached)	scent Adapto		
Assuming that	only 700	7 the bu	165 cm be replace 5 25 90 6 4.69 lyr	ed Total = 3	7.00(.7) = 25.90
	rayba	CR. = <u>+</u>	25:90 4.69 Jur	= 5,3 U	
	SIR =	2.11		(see alla	ched)
					· · · · · · · · · · · · · · · · · · ·
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				· · · · · · · · · · · · · · · · · · ·	, , , , , , , , , , , , , , , , , , ,
					· · · · · · · · · · · · · · · · · · ·

EDRIC D. O. CHONG & ASSOCIATES, INC.

CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawaii 96819

Telephone (808) 847-6557

Telefax: (808) 847-6550

DATE:	JOB No	.:	
PROJECT NAME:		BY:	
SUBJECT:		Sht. 3-5	5

TASK DESC TASK DESC E: Fluores. Pelsa Lig (Bobby &	PROJECT ABOL RATE : 421.8(3)	* 21,8(+ 15/	7.18		38,	SAY	ESTIMATOR CF	3 = 3	CHECKED BY	SHEET	OF	
4 May 0.6 WIT WIN THIS PRICE COST WIT C	700	QUANI	7.11		_	ABOR		5	UIPMENT	Ì	AFERIAL	
1 20 64 0.15 38.24 18 20 20 27. 30.15 18.24 19. 32. 32. 37. 32. 32. 37. 32. 37. 32. 37. 37. 37. 37. 37. 37. 37. 37. 37. 37	TASK DESC		UNIT	TIMS SWIT	TOTAL HRS	PRICE	COST	PRICE	COST	UNIT	COST	TOTAL
1 20 62 61 61 61 61 61 61 61 61 61 61 61 61 61	0											·
Japhn 0 & 0 & 0.15 20 20 21 21 21 21 21 21	Fluores.	0	EA	0.15		58.24				8/ .		
Japhn 0 EA 0.15 20 22 27 27 22 27 27 24 27 27 27 27 27 27 27 27 27 27 27 27 27												
1 24 0.15 4 5.73 22 22 27 27. 27. 24. 27. 27. 27. 27. 27. 27. 27. 27. 27. 27	Flue Hes.	0	\$	0.15						2		
1 EA O.15 D.13 D.22 22 27. 1 Subt to (107) 2. 2 Subt to (107) 2. 2 O/H (157) 4. 1 To \text{Au} (47.) 0. 2 \text{Au} \text								·			•	
5. Subhble 1 27. Subhble 1 27. Poft (107) 2. O/H (152) 4. Tax (47.) 1. Bond (17.) 0. \$2. \$2. \$2. \$2. \$2. \$2. \$2. \$	Flushes.	/	£A	0.15	0.15	\rightarrow	i . I			22	22	L
27. Subhb (1 07) 27. Profit (107) 2. Tox (47.) 4. Tox (47.) 6. Sold (17.) 6. (524-31 44) 87.							•					
Subht (107) 27. Profit (107) 2. Profit (107) 2. O/H (152) 4. Tax (47.) 1. Bond (17.) 0. \$2. \$2. \$2. \$3. \$3. \$3. \$3. \$3												
2. Profit (107) 2. O/H (152) 4. Tox (47.) 1. Esch (17.) 0.									tygns			27.73
$\frac{O/H}{12x}$ (47.) 4. $\frac{1}{12x}$ (47.) 6. $\frac{1}{12x}$ (47.) 7. $\frac{1}{12x}$ (47.) 6. $\frac{1}{12x}$ (47.) 6. $\frac{1}{12x}$ (47.) 7. $\frac{1}{12x}$ (524-57.44) $\frac{1}{12x}$ (524-57.44)						•			Profit	\simeq	_	2.77
ot. w/ (524-37 44) (524-37 44)									н/о	(15%		4.56
26. — Total (176.) 0. 26. — Total (176.) 36. 26. — Total (176.) 36. 27. — Total (176.) 36. 28. — Total (176.) 36. 29. — Total (176.) 36. 20. — T										(47.		1.40
26. Total 36.									Band	61)		0.36
ot. ω/ ot. ω/ (524-51 44) (524-51 44)							-					
2tr w/ SAY #37								·	Total			36.82
2t. ul (524-37) 44) 3)			٠			·					×ā.	
(524-37 44)	7 :										544	\$37.00
(524-37 44)	lati cust anot										\	
	c Lighting (524-	177										
	1 Glomon)											
	D											
	-											
	•											
									-			
	•											

LOCA	_: NO I T/			RÉ	GION NO	PROJECT NUM	BER
PROJ	ECT TI	ITLE _	Replac	eIncade	Scent Light E Go-I	nts Fis	CAL YEAR
DISC	RETE I	PORTIC	NAME	JNIT TYP	°€ 60-I 0	 	
ANAL	YSIS (DATE _		E	CONOMIC LIFE	25 YEAR	S PREPARED BY
	B. 51	ONSTRU 10H	CTION COS)	C)X.9 QUIPMENT	2	5.90 1.42 2.59 6.92 \$_26.92
	ENERGY	Y SAVI	INGS (+) /	COST (-)	NIT COST \$ D	ISCOUNTED SA	VINGS
			\$/MBTU(1)	MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	FACTOR(4)	SAVINGS(5)
			19.91	0.23 lunit	\$ 4:69 \$ \$ \$	<u> 2. 2</u>	\$ 56.84 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
	F. TO	TŅL			\$ 4.69		\$ 56.84
3.	۸. ۸۱	NHUAL	RECURRING ISCOUNT FA	+) / COST ((+/-) CTOR (TABLE SAVING/COST		\$_ \$_ \$_	0
	B. N	ON RE	CURRING SA SAVINGS COST \$	VINGS (+) / (\$ (+) Y (-)(1) OCC	COST (-) EAR OF EURRENCE(2)	DISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
			\$\$ \$ AL \$				\$\$ \$\$
	c. T	OTAL	NON ENERGY	DISCOUNTED	SAVINGS (+)	/ COST (-)	(3A2+3Bo4) \$ <u>O</u>
	(1) 2 b c	15% MA 1. IF 1. IF	X NON ENCR = 21 [02 30] [13 = 21 [] 30]	3C CALC 1 GO TD	5 X .33)) TO ITEM 4 SIR = (2F5		<u>\$ 18.76</u>
4.	FIRST	YEAR	DOLLAR SA	VINGS 2F3+3	BA+(3B1d : YF	ARS ECONOMIC	Life) \$ 4.69
۶.	TOTAL	NET	DISCOUNTER	SAVINGS (2	PF5+3C)		\$ 56.84
6.	S1P. ([]F	1 PROJECT	DDES NOT OF	JALIFY) (SIR)	=(5 : 18)=	2.11.

																	·											
							רנט)	_0(CA:	ΓLO	Ŋ	:			T/A			•	į	1	ER			ΑI		
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						60	> -J	C.			4	۲_					45					G				27	o k	wH/
				•	.	<u> </u>						•	1	,				:			- :					:	:	 ;
	A	ىيى	nin	S	Eha	4.4	n L) J	2	که	the	la	zp.	Ç	7	se.	rep	loc	d		7	ota	l :	2	270	(;	70) = . 0	189
<u>:</u> 						.A.	ンシン	LAL	ے ، ح	N.ª	RC 89	Ku	/H	Dav	<i>ا</i> د د	3	vep GS	D	~J	 این	= 2	19		Kω	H] U	 		
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							1Vi	LA) 	ِ م	57. 69	ا لا لا	4V. v#	W6	ى X	(1	0	. 0	68		المال	1	=	#	4	69	<u>.</u> •	
 					<u> </u>		<u>.</u>				••••••				بد سدخ		~ p~		······································				: :			: : : :		:
						10		1	40	r h	o d	()		:	:		ler	:	:		:					: * * * * * ; !		i
	As	5u/	<u>مرت</u>	<u>.</u>	ha	t. 1	nl	, 7	09. L	07	Ge A	las	75	ca	. دو	þе	rep	lace	ad)		7	-ta	<i>ኒ -</i>	37	7, ευ	(.7	= (ه	# 25.
		; 40. **Q. ** ** **			·	1.0	yr	ac	Κ.	. -	#)	4.	69	0	14	<u> </u>	-5		- برخ ا		gr	. کج					
					••••		· · · ·									0						• • • • • • • • • •						
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CEDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawaii 96819

Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.	
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-58

	1195ts				_	ESTIMATOR	CHE	CHECKED BY	SEE!	Q.	S
<u> </u>	J QUANTITY	וודץ		ر ر	LABOR		E0.	EQUIPMENT	¥	MATERIAL	
CRIPTION	NO. OF UNITS	UNIT	11NY HH	TOTAL HRS	UNIT	COST	PRICE	COST	PRICE	COST	TOTAL
. 0											
Fluores. Adapta	0	EA	0.15		28.2				8/		
Flue HE. Adapha	0	\$	0,15						2		
- 1											
Flustes. Adapto	7	£4	0.15	0.15	\rightarrow	5.73			27	22	27.73
						•					
								THANS	7		27.73
					٠			Prof.t	(10%		2.77
								н/о	(15%		4.56
								1 xx	(47		94.1
								Bond	(1%		0.36
						•					
								Total			36.82
										544	\$37.00
cust anote ul											
19in (524-37	(**										
المسما						•					
									·		
•											
						·					

	ATION:	REGION NO	PROJECT NUM	BER
PROJ	ECT TITLE Replace Inca	descent Light	hts Fis	CAL YEAR
DISC	CRETE PORTION NAME UNIT T	YPE CO-II		
ANAL	YSIS DATE	ECONOMIC LIFE	25 YEAR	S PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) D. ENERGY CREDIT CALC (1A+1) E. SALVAGE VALUE OF EXISTIN F. TOTAL INVESTMENT (1D-1E)	B+1C)X.9 G EQUIPHENT	£	90 1.42 2.59 6.92
?.	ENERGY SAVINGS (+) / COST (-ANALYSIS DATE ANNUAL SAVINGS		ISCOUNTED SA	VINGS
	FUEL COST SAVING FUEL \$/MBTU(1) MBTU/YR	(2) SAVINGS(3)	FACTOR(4)	SAVINGS(5)
	A. ELEC \$ 19.91 0.235/L B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	hit \$ 4.69	12.12	\$ 56.84 \$ \$ \$
	F. TOTAL	\$ 4.69		\$ 56.84
3.	NON ENERGY SAVINGS (+) / COS A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (T/ (2) DISCOUNTED SAVING/O	ABLE 1)	\$_ \$_	0
	B. NON RECURRING SAVINGS (+) ITEM SAVINGS \$ (+) COST \$ (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a.			\$ \$ \$
	C. TOTAL NON ENERGY DISCOUN	NTED SAVINGS (+)	/ COST (-)	(3A2+3Bo4) \$
	D. PROJECT NON ENERGY QUAL (1) 25% MAX NON ENERGY CALC a. IF 301 IS = OR 30 b. IF 301 IS 3C CALC c. IF 301b IS = 1 GO d. IF 301b IS 1 PROJE	(2F5 X .33) C GO TO ITEM 4 SIR = (2F5 TO ITEM 4	+3D1) : 1F =	\$ 18.76
4.	FIRST YEAR DOLLAR SAVINGS 2	F3+3A+(3B1d : YF	ARS ECONOMIC	LIFE) \$ 4,69
5.	TOTAL NET DISCOUNTED SAVING	s (2F5+3C)		\$ 56.84
6.	SIR (IF 1 PROJECT DOES NO	T QUALIFY) (SIR)	=(5:1F)=	2,11

Assuming t		E ,	OCAT	2	LIGHTIA SAVING 45	5 (w) D	RS PER AY OPER G	DAILY SAVINGS 270 KWH/C
Assuming t	GO-II hat only ANK	T			45		<i>G</i>	270 KWH/p
Assuming 1	hat only ANN							
Assuming 1	hat only ANN							
Assuming 1		70.7. a UAL E	NERG	Jampas 4 9 SAV	en he sept	end T	ifal=0.7	0 (270) = 1891
Assumine 1		707. a UAL E	NERG	Janges of	on he repl	earl To	ifal-0.7	0 (270) = 1891
Assuming 1		<i>ر 10%.</i> ع با UA	NERG	y SAV	on he replace	such Ti	fal = 0.7	10 (270) = 1891
		UAL ک =	NERG	y SAV		: ' :		un tradado Total India
			() ()	1 - 2 -	1063	- Day 1	-/a t	cull 1
		2	J. 10.1	120	12 aig X; 20	<u> 5 719</u>	r = <u>0</u> 7	7,14
			g					and the second s
		ر بربیر -	160	KOUH!	165 , × (#0.	112/2) I	Ц 69
			<u> </u>	19	$r = (\pi_i Q_i)$	JUDIKUH	7	
	Lost	for	Flinn	Scort	adapter	= \$ 3	7.00	
	(500	atta	ched)	adapter			
Assumin	that or	il 70	9 0	be lan	or con le	Enlaced	Total =	0.70 (37)=25.
7	Pairle	ack	= \$	25	90	= 5	5,40	: : : : : : : : : : : : : : : : : : :
	Ú		#	4.0	9 /ur		đ	0.70 (37)=25.
	:				\mathcal{O}			
	SIR	. = .2				(see c	attached)
		·						
								والمستقد والمراوع والمسترورة
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CEDRIC D. O. CHONG & ASSOCIATES, INC.
CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawali 96819
Telephone (800) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-61

PROJECT ABOR RATE: \$21.81+7	\$ 21.81 + 75% LB	7.18	. 3	38.	SAS	# TIMAT	38.20 OR CHE	OHECKED BY	SHEET	o.	S
	QUANT	7.11			ABOR		69	EQUIPMENT	ž	MATERIAL	
Unit Type	MO. OF UNITS	UNIT	TIM5	TOTAL	PRICE	COST	PRICE	COST	PRICE	COST	TOTAL
											23
900 Fluores, Adapho	0	72	0.15		58.2				18		
11W Fluence. Adoppe	ອ	\$	0.15						2		
							•_			,	
15W Fluers. Adapta	,	£A	0.15	51.0	\rightarrow	5.73			22	77	27.73
						•					
								14 th 17	حا		27.73
								Pro Cit	(10%)		2.71
								н/о	(15%		4.56
								1 xx	(4%		7.48
								Bond	(19		0,3%
								Total			36.82
		•									-12
NOTE:										544	37.00
a) Mat'l cost anote ul										,	
Pelsa Lighting (524-37	(44)										
y delamon)			-								
D											
		·									
•											
DA FORM 5418-R, Apr 85 CONTD											

LOC/	ATION:		REGION NO	PROJECT NUM	BER
PROJ	ECT TITLEK	Replace Inc	adesant Lig Type Go-亚d	hts Fis	CAL YEAR
ANAL	YSIS DATE		ECONOMIC LIFE	25 YEAR	S PREPAREO BY
	INVESTMENT CO A. CONSTRUCT B. SIOH CS C. DESIGN CO D. ENERGY CR E. SALVAGE V F. TOTAL INV	1011 COST	+1B+1C)X.9 ING EQUIPMENT E)	\$ 2: \$	590 1.42 2.59 6.92
2.	ENERGY SAVING ANALYSIS DATE		(-) ÇS, UNIT COST \$ D:	ISCOUNTEO SA	VINGS
	FUEL \$/M	120 T20 10 TU(1) UTBN	NGS ANNUAL \$ YR(2) SAVINGS(3)	OISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
	A. ELEC \$1 B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$				\$\$ \$\$ \$
	F. TOTAL		s 4-69		5 56.84
3.	A. ANNUAL RE	AVINGS (+) / CECURRING (+/-) COUNT FACTOR (* COUNTED SAVING		\$_ \$_	0
	ITEM	SAVINGS \$ (+)	(+) / COST (-) YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR (3)	OISCOUNTEO SAV- INGS (+) COST(-)(4)
	a b c d. TOTAL	\$ \$ \$			\$ \$ \$ \$
	C. TOTAL NO	N ENERGY DISCO	OUNTED SAVINGS (+)	/ COST (-)	(3A2+3Ba4) \$ 0
	(1) 25% MAX a. IF 3 b. IF 3 c. IF 3	NON ENERGY CAL D1 IS = OR D1 IS = 3C CAL D1b IS = 1 G	3C GO TO ITEM 4 .C SIR = (2F5	3+3D1) : 1F =	s 18.76
4.	FIRST YEAR D	OLLAR SAVINGS	2F3+3A+(3B1d: YF	ARS ECONOMI	C LIFE) \$ 4.69
5.	TOTAL NET OF	SCOUNTED SAVIN	IGS (2F5+3C)		\$ 56.84
6.	SIR (IF 1	PROJECT DOES A	OT QUALIFY) (SIR)	=(5 : 1F)=	2.11

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CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawail 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	1	JOB No.:		
PROJECT NAME:			BY:	
SUBJECT:			Sht.	3-64

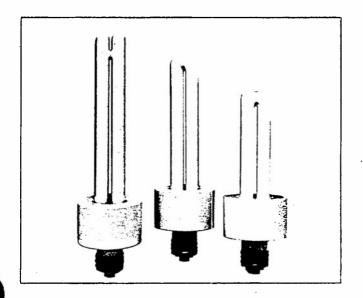
		REGION NO.		
PROJ	JECT TITLE Replace	Incadescent Light	nts Fisc	AL YEAR
0210	CRETE PORTION NAME U	Incadescent Light NIT TYPE 71-I		
ΑΝΛΙ	YSIS DATE	ECONOMIC LIFE	25 YEARS	PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10.7) D. ENERGY CREDIT CALL E. SALVAGE VALUE OF F. TOTAL INVESTMENT	7~) C (1A+1B+1C)X.9 EXISTING EQUIPMENT	\$ 25 \$ 1 \$ 2 \$ 2 \$ 3	.90 42 59 6.92
2.	ENERGY SAVINGS (+) / ANALYSIS DATE ANNUAL	COST (-) SAVINGS, UNIT COST \$ DI	ISCOUNTED SAV	INGS
	FUEL \$/MBTU(1)	SAVINGS ANNUAL \$ MBTU/YR(2) SAVINGS(3)	FACTOR(4)	SAVINGS(5)
	A. ELEC \$ 19.93 C. RESID \$	0.314/mit \$ 6.26	2.12	\$ 75.87 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
	F. TOTAL	\$ 6.26		\$ 15.87
3.	NON ENERGY SAVINGS (+ A. ANNUAL RECURRING (1) DISCOUNT FAC (2) DISCOUNTED S		\$_ \$_	0
	ITEM SAVINGS	TINGS (+) / COST (-) \$ (+) YEAR OF (-)(1) OCCURRENCE(2)	DISCOUNT FACTOR (3)	DISCOUNTED SAY- INGS (+) COST(-)(4)
	a\$\$ b\$\$ c\$ d. TOTAL \$			
	C. TOTAL NON ENERGY	DISCOUNTED SAVINGS (+)	/ CDST (-)	(3A2+3Bo4) \$ <u>O</u>
	b. IF 301 IS (c. IF 301b IS =		+3D1) : 1F =	<u>\$ 25.04</u>
4.	FIRST YEAR DOLLAR SAY	VINGS 2F3+3A+(3B1d : YF	ARS ECOHOMIC	LIFE) \$ 6.26
۶.	TOTAL NET DISCOUNTED	SAVINGS (2F5+3C)		\$ 75.87
6.	SIR (IF 1 PROJECT)	DOES NOT OHALIFY) (SIR)	=/5 · 1F\=	2 01

SPECIFICATION GUIDE



The Leading Edge In Lighting Technology

OPTIMUM PERFORMANCE "ER" ADAPTERS*



Reduce energy costs by 75% with EASTROCK TECHNOLOGY'S Compact Fluorescent Adapters.* Optimum Performance Adapter's are designed to operate ALL BRANDS of Compact Fluorescent Lamps within Manufacturer's specifications. EASTROCK'S unique potted double C-Core ballast design allows for the lamp to seat within the case yielding the shortest installed height. Also available with a tapered lamp harp base.

*Patent Pending



UNDERWRITERS LABORATORIES INC. LISTED

APPLICATIONS:

Optimum Performance "ER" Adapters* are recommended for use where energy guzzling incandescent lamps are in use and energy savings and maintenance cost reductions are required.

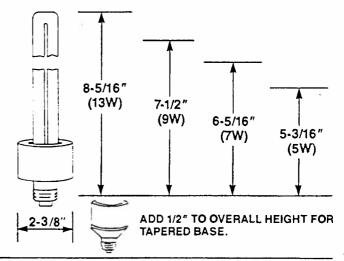
- Schools
- Hospitals
- Hotel/Motels
- Apartment Complexes
- Residences
- Restaurants
- Industrial Complexes
- Office Buildings
- Convenience Stores
- Retailers
- Shopping Centers
- Museums
 - And Many Others . . .

SPECIFICATIONS:

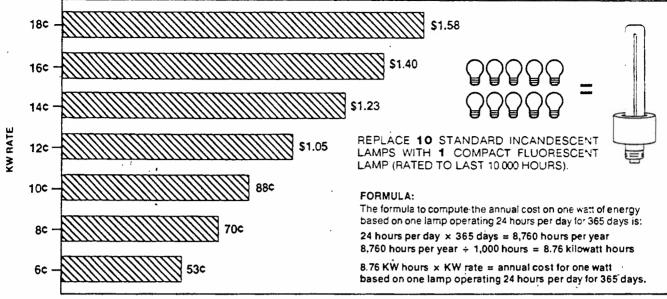
- 1. ADAPTER SYSTEM: Shall contain a C-Core ballast constructed of grain oriented silicone steel wound with A insulated copper wire and inserted into a Valox[®] 855 (360°) case. The case is to be filled with enhanced potting epoxy and sonic-welded to insure durable life. Ballast shall operate all brands of Compact Fluorescent Lamps within manufacturer's specifications.
- LAMP RECEPTACLE: Shall allow the lamp to seat within the adapter case where a spring clamp secures the lamp in place.
- ADAPTER BASE: Shall be a self-ratcheting, medium brass base to prevent overtightening.
- COMPATIBLE LAMPS: The Optimum Performance Adapters will accept specific wattage lamps manufactured by Philips, G.E., Sylvania, and Osram.

DIMENSIONS: (Overall Height)

- May vary according to different lamp manufacturers.



ANNUAL COST FOR ONE WATT OF ENERGY



Annual cost for one watt for 24 hour operation.

ANNUAL ENERGY SAVINGS WITH EASTROCK TECHNOLOGY

SAVINGS 18 W	6c 9.54	8c 12.60	10¢ 15.84	12¢	14c 22.14	16c 25.20	18c 28.44	SYSTEM PAYBACK
1		12.60	15.84	18.90	22.14	25.20	28 44	6M0 - 18M0
1 0	1						1 -0. 17	1 0 1000.
31 W	16.43	21.70	27.28	32.55	38.13	43.40	48.98	4 Mo 12 Mo.
49 W	25.97	34.30	43.12	51.45	60.27	68.60	77.42	3 Mo 7 Mo.
60 W	31.80	42.00	52.80	63.00	73.80	84.00	94.80	2 Mo 6 Mo.
-	1	,		60 W 31.80 42.00 52.80	60 W 31.80 42.00 52.80 63.00	60 W 31.80 42.00 52.80 63.00 73.80	60 W 31.80 42.00 52.80 63.00 73.80 84.00	

ORDERING INFORMATION: Add T for tapered lamp harp base — Example: ERT-9

CATALOG NUMBER	DESCRIPTION	LAMP WATTAGE	SYSTEM WATTAGE	LUMENS	INCANDESCENT EQUIVALENT	OVERALL HEIGHT
ER 5	5 WATT ADAPTER	5W	7W	250	25W	5-3/16"
ER 7	7 WATT ADAPTER	7W	9W	400	40W	6-5/16"
ER 9	9 WATT ADAPTER	9W	11W	600	60W	7-1/2"
ER 13	13 WATT ADAPTER	13W	15W	900	75W	· 8-5/16"

LIMITED WARRANTY: All adapter systems manufactured by EASTROCK TECHNOLOGY, INC. are warranted to be free from defects in workmanship and materials, as manufactured, for a period of two full years from date of manufacture.

Our warranty covers only replacement or repair at our factory or authorized repair facility of the defective part(s), to the original purchaser, and excludes any responsibility for labor or freight expense incurred by the purchaser or others, for servicing any such claim during the warranty period.

EASTROCK TECHNOLOGY, INC. reserves the right to issue credit, repair or replace the defective merchandise, at our option, upon receipt of written notification by the purchaser of the alleged defect, within the warranty period. EASTROCK TECHNOLOGY, INC. further reserves the right to examination of the alleged befective product, or other proof, satisfactory to EASTROCK TECHNOLOGY, INC. of the defect.

This limited warranty is in lieu of all other warranties, expressed or implied. EASTROCK TECHNOLOGY, INC. assumes no responsibility for labor costs in connection with the installation, removal or replacement of warranted products, or for any consequential damages. EASTROCK TECHNOLOGY, INC. further reserves the right to refuse to honor the above warranty for any product(s) altered, improperly installed, or installed in applications for which not intended.

MADE IN U.S.A.

DISTRIBUTED BY



The Leading Edge in Lighting Technology

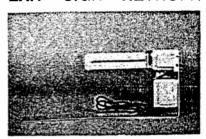
EASTROCK TECHNOLOGY, INC.

30-40 Northfield Ave., Raritan Center P.O. Box 6231 • Edison, NJ 08818

Telephone (201) 225-5344 • Fax: (201) 225-8765

RETROFITS

EXIT SIGN RETROFITS



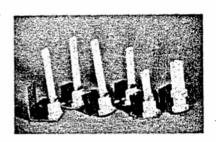
CAT# Reduces energy costs and provides extensive savings in labor and lamp replacement costs due to extremly long life of PL lamps.

R-100 PL bracket mounted prewired kit for ease of installation.

R-101 Equiped with PL-5, 2x5, 7, 2x7 or 9 watt lamps; 120 volts.

Height 4", Width 9 1/2", Depth 1 1/8"

HARD WIRED DISC OR L BRACKET



CAT# Replaces short lived incandescent bulbs in existing fixtures...

R-200 Suitable for retrofitting recessed canopy lighting, pagodas, wall or

R-201 ceiling fixtures.

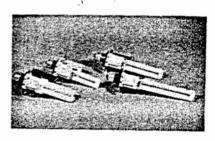
R202 Equipped with PL-5, 7, 9, 9D, 13 or 13D watt lamps.

CAT# DISC L BRACKET 23/4' dia. Depth 21/2', Width 21/4'.

R-300 R-301 R302

H302

SCREW-IN ADAPTERS



CAT#

Medium edison base screws into existing socket. Replaces short lived incandescent bulbs in existing fixtures. Many applications.

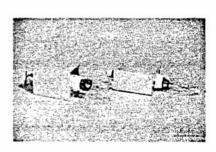
R-400 " R-401 E

Equipped with PL-5, 7, 9, 9D or 13D watt lamps.

R-402

Disc 23/4" DIA.

HIGH PRESSURE SODIUM CANNISTER SCREW-IN



CAT#

Energy saving conversion unit containing ignitor and 120V HPS ballast in aluminum cannistar with top mounted medium base socket for HPS lamp.

ica i

R-500

Available with medium edison base or 3/8" nipple.

R-501 Equipped with HPS 35, 50 or 70 watt lamp.

Cannister 4 1/2" x 3 1/2" x 2 1/2"

Overall dimension including lamp 9 1/2"

BEL

Beigrade Efficient Lighting

4424 W. Pico Boulevard, Los Angeles, CA 90019

(213) 933-5233

FAX 933-5249



PACSIMILE TRANSMISSION

THE FOLLOWING IS A FAX TRANSMISSION FROM: SUNBURST DESIGNS, INC. 808-841-6296(FAX)

TO:

Linda : C. CHONG

FROM:

LINDA MORAN

DATE:

9-1-92

THERE ARE

2 PAGES IN THIS TRANSMISSION INCLUDING THIS

COVER SHEET

SUBJECT:_

BEL SIZES

PL RETROFITS

MESSAGE:

Hi Linda,

Per our conversation, here are the height's of the various BEL retrofits that we represent.

If I can be of further assistance on this or any other lighting project, please feel free to call on my assistance.

Thanks

AUG 28 192 15:09 ASHPONDATION

05/02/92

P.1/1

TO: SUNBURST DESIGNS

ATTN: LINDA MORAN

DATE: 8-28-92

RE: YOUR FAX FROM 8-27-92

SUBJECT: R-400,401,402 retro's

MESSAGE: Height 35 from the bottom of base to the top of transformer

Width 24

PLEASE CONTACT US FOR MORE INFORMATION.

OUR NEW PHONE # 15: 310-672-9794

OUR NEW FAX # 16: 310-672-9813

THANK YOU !



1223 Wilahire Boulevard #574, Santa Monica, CA 90403 Tei (310)672-9794 Fax:(310)672-9613

DEC 21 '90 15:53 BEL



RECEIVED DEC 2 1 1990

BEL efficient lighting 2531 E. 115TH PLACE, LOS ANGELES, CA 90059, TEL (213)587-7240 FAX. (213)567-9343

12.21.90

Linda Molan

Sun burst designs

Re your fax transmission of today subject l-400, 401, 402 RETROS

Michael

ME SILVER

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CEDRIC D. O. CHONG & ASSOCIATES, INC.
CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawaii 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-68=

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CEDRIC D. O. CHONG & ASSOCIATES, INC.
CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawaii 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-68F

3.3 Enec	gy Conserving Fluorescent Lie	ght of Ballast
	kground:	
		I can be replaced with
env	sting fluorescent fixtures the guefficient lamps and ele	ctronic ballasts are
2, A550	emptions:	
a.	New fluorescent fixtures a ballasts and energy saving	ill have electroric
	<u> </u>	and the second of the second o
Ь.	Lighting levels will be incre IES orecommended levels	ased to comply when where possible
	والمرابعة والمستقل والمرابع والمرابع والمرابع والمرابع والمرابع والمستقل والمستقل والمستقل والمرابع والمرابع والمرابع	
	Exist. light fixtures have the	
	1) Single lamp 4-40W FI. FI 2) Two lamp, 4-40W " 3) Four lamp, 4-40W FI. 1	ixture: = 57 ω ' = 95 ω
d.	New Light Fixtures will have	
	1) Single lamp, 4'-40ω Fl. 2) Two amp, 4'-40ω "	fixture = 35 W
	3) Four lamp 4'-40 w "	" = 109 W
3. Comp	parison of Energy Usage:	
	following tables	

EDRIC	D.	0.	CHON	3	å	ASSO	CI	A٦	res,	INC	•
ONCLUT	NG I	460	HANICAL	£	C 1	ECTRICA	l I	EN	CINE	993	

CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
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Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-69

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DRIC D. O. CHONG & ASSOCIATES, INC.
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Telephone (808) 847-6557
Telefax: (808) 847-6550

DATE:	JON No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-70

ENERGY (W)	18	0.00			22		
ENERGY USED(6)	60/	601	2		352		
000			plan				
75 (%) (%)	601	60)	f)		25.		
AREA (SF)	11.7	9	, , , , , , , , , , , , , , , , , , ,	3	73		
ENERGY USED	061	061	The same	col fixh	57.		
ОИАЙ.			2-II hos 7	fluorescut		· · · · · · · · · · · · · · · · · · ·	
£χι <i>ST.</i> F1 χτ. (ω 'Luns)	74-04	40-44	12e 32	lacable	71-0h	• • • • • • • • • • • • • • • • • • •	
LOCATION	KITCHEN LAUNDRY	BATHROOM	Unit Type 32-II hos the	Rep	ВАТН 2		
UNIT TYPE.	32-I		NpTE:	32:11	32-II		

EDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawall 96819
Telephone (808) 847-6557 Telefax: (808) 847-655

130-E North King Street				
'elephone (808) 847-6557	' Tol	efax: (808) 84	17- 6550

DATE:	N GOL	o.:
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-7/

DRIC D. O. CHONG & ASSOCIATES, INC.
NSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawali 96819
Telephone (808) 847-6557
Telephone (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:	ВҮ	•
SUBJECT:	Sh Of	1. 3-72

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	ENERGY	00	5	2	45	×		
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DRIC D. O. CHONG & ASSOCIATES, INC.

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Telephone (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-73

) 4.	Summary of Saving	22 (per unit):	
	Summary of Savina		
		LIGHTING HRS PER DAY SAVINGS (W) IN OPERATION	DAILY SAVINGS (KWH)
	20-IV KITCHEN	8] 4	0.324
	ANNUAL ENERGY SAY	11NGS (per unit)	
		11N6S (per unit) H/Day × 3G5 day/yr = 118 Ku	
	ANNUAL COST SAVIA	JGS (por Unit) JR X (\$0.068/кшн) = \$8.0	2
	Cost of New Energy (see attached)	Saving Fixture = \$ 600	
	Payback = \$ 60	00 = 74.8 yrs	
	SIR = 0.16	(see attached)	

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Telefax: (808) 847-6550

DATE:	JOB I	10.:	
PROJECT NAME:		BY:	*****
SUBJECT:		Sht.	3-74

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443.8 44.34 15.99 44.34 598.59 424.30 TOTAL 9.10 900 0 0 8 COST 3 367 10%) MATERIAL %0 UNIT SHEET 367 186 121 SUBTOTAL ti PEOFI ८ मण HOTAL COST \mathcal{I}/\mathcal{O} CHECKED BY EQUIPMENT PRICE ESTIMATOR 19.10 57.30 COST 38.3 PRICE LABOR d NAA TOTAL HRS 5, 0.5 F39 CHIE THE 1,50 24 ントイ 0./ 0/:/0 401 0.5 उ FIXTURE ES UNIT KEAS EA. 2 A 8 75 K. QUANTITY ECTRI ! 2000 BOOK HO. OF UNITS 0 0 MEAN'S ECL FLUOR 5 NEW 2 LAMP, SURFACE FIX. ELECTRICAL TRADE SUCFACE FIX. 1221121 Fxtre NSTALL NEW 20-11 Type 20-1 SURFACE FIXTURE SINGLE LAMP 73. electronic 4 LAMP, £x:x3 Price Prices Reasie NEW Note MEW. PROJEC P

DA FORM 5418 .R, Apr 85 CCNTD

LOCAT	T10H:		REG	10H NO	PROJECT NUM	BER	
PROJE	CT TITLE	INSTAC	L NEW	Fluor. F	FIX. FIS	CAL YEAR	
DISCI	RETE PORTI	ION NAME U	NIT TYPE	20 - IV			
ANAL'	YSIS DATE		EC	ONOMIC LIFE	25 YEAR	S PREPARED BY	•
! (B. SIOH C. DESIGN D. ENERGY E. SALVAG	RUCTION COST (5.57) R COST / R CHEDIT CAN	o つ。) .C (IA+IB+IC EXISTING EQ	1X.9	1 3	0.60 3.00 0.00 23.70	23.70
			COST (-) SAVINGS, UN	IT COST \$ 0	ISCOUNTED SA	VINGS	
1	FUCL	\$\WRLA(J)	SAVINGS MUTU/YR(?)	YNJUYF \$	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)	
,	A. ELEC B. DIST C. RESID D. NG E. COAL	\$ 19.90 \$ \$	0.403/unit	\$ 8.02	2.12	\$ 97.20 \$ \$ \$ \$	
	F. TOTAL			\$ 8.02		s 97.	20
3.	A. ANNUA	L RECURRING	+) / COST (- (+/-) CTOR (TABLE SAVING/COST	1)	\$_ \$_	0	
	E. NON R ITEM	ECURRING SA SAVINGS COST \$	VINGS (+) / \$ (+) YF (-)(1) DCC	COST (-) TAR OF JRRENCE(2)	OISCOUNT FACTOR (3)	DISCOUNTE INGS (+) CO	D SAV- ST(-)(4)
	· ·	\$ \$ OTAL \$			•	\$\$	
		-		SAVINGS (+)	/ COST (-)	(3A2+3Ba4)	\$
	D. PROJE (1) 25% P a. 1 b. 1	CT NON ENER MAX NON ENER F 301 15 = F 301 15 IF 301b 15 =	GY QUALIFICA GY CALC (2F) OR 3C GO 3C CALC) GO TO	ATION TEST 5 X .33) TO 17LM 4 SIR = (2FS	:+301) : 1F :	\$ 32.08	
4.	FIRST YEA	NR DOLLAR SA	VINGS 2F3+3	A+(3B1d: YF	ARS ECOHOMIC	c Lire) s 8	.02
٥.	TOTAL NET	ו סוככסטודננ	SAVINGS (2)	F5+3C)		\$	
6.	SIR (IF	1 PROJECT	DOES NOT OU	ALIFY) (SIR)	=(5 : 15)=	0.16	

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FDRIC D. O. CHONG & ASSOCIATES, INC.
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101ephone (800) 847-6557 Toletax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-7.7

LYLUNK KATIE . T-1.01+ 13 10 LD - 30.16 37

PROJE NEW FLUOR		FIXTURE ES			\neg	ESTIMATOR			SHEE	5	l S
	QUANTITY	TITY			ABOR		EQ	EQUIPMENT	Ä	MATERIAL	200
TASK DESCRIPTION	NO. OF UNITS	UNIT	MH/ MHT	TOTAL HR3	UNIT	COST	PRICE	COST	UNIT	COST	TOTAL
0											
Remove Exit fixture	1	EA	5.0	5.0	38.20	19,10					19:10
NEW SINGLE LAMP	0	RA.	7.0		-	0			151		0
SURFACE FIXTURE											
		٠							·		
NEW 2 LAMP SURFACE FIX.	0	EV	1.10			0			186		0
1						·					
NEW 4 LAMP, SURFACE FIX.		2A	1,50	ح./	\rightarrow	57.30			367	178	424.30
											•
								SuBTb	74		443.40
								CITY	45	(107.)	た。井
NoTE:								PROF	7 (107.)	#:34
a) Prices for fixture incl	de	3	787	,				0/14	(15	()	15.29
onic ballast	lascu	25 50	. VIrs	9	Q						
	0	_)			•		70TAL	١		598.59
6) Prices from Home Electri	cal	159	Date	ړ							
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DA FORM 5418 .R, Apr 85 CONTD											

LOCA	\T10!!:		REG	ION NO	PROJECT NUM	BCR
PROJ	ECT TITLE	INSTA	LL NEW	Fluor.	FIX. FIS	CAL YEAR
DISC	CRETE PORT	ION NAME	UNIT TYP	E 20-II		
ANAL	YSIS DATE		co	ONOMIC LIFE	25 YEAR	S PREPARED BY
	B. SIOH	RUCTION COS (5.57)	T O T.) LC (1A+1B+1C EXISTING EC (1D-1E)	:)X.9)UIPMENT	1 35 1 6	\$.00 6.00 3.70 \$
?.		YINGS (+) / DATE ANNUAL		IIT COST \$ D	ISCOUNTED SA	VINGS
		\$/MBTU(1)	MBTU/YR(2)	SVAINCE(7)	DISCOUNT FACIOR(4)	SAVINGS(5)
	A. ELEC B. DIST C. RESID D. NG E. COAL	\$ 19.90 \$	0.403/un.t	\$ 8.02	12.12	\$ 97.20 \$
						\$ 97.20
3.	A. ANNUA	L RECURRING	+) / COST (- (+/-) CTOR (TABLE SAVING/COST		t _	0
		COST \$	(-)(1) OCC	JRRENCE(2)	FACTOR (3)	DISCOUNTED SAY- INGS (+) COST(-)(4)
		\$ \$ \$ \$				\$
				SAVINGS (+)	/ COST (-)	(3A2+3Ba4) \$
	(1) 25% P a. ! b. !	MAX NON ENEI IF 301 IS = IF 301 IS IF 3016 IS :	RGY QUALIFICATOR CALC (2F OR 3C GO 3C CALC I GO TO I PROJECT	S X .33) TO ITEM 4 SIR = (2F9 ITEM 4	S+3D1) : 1F :	\$ 32.08
4.	FIRST YE	AR DOLLAR S.	AVINGS 2F3+3	A+(3B1d: YI	TARS ECONOMI	C LIFE) \$8.02
٢.	TOTAL NE	T DISCOUNTE	D SAVINGS (2	rs+30)		\$ 97.20
6.	SIR (IF	1 PROJECT	DOES NOT QU	ALIFY) (SIR)=(5 : 15)=	0.16

	UNIT	LOCAT	TON	LIGHTING	HRS PER DAY	PAILY
-,	TYPE			SAVINGS (W)	WOFTRATION	SAVINGS (KMI)
	32-I	KITCHS	Į.	81	4	0.324
	£32-Ⅱ	LAUND	eu	81	2	
		LAMP				0.162
		BATHR	00M	81	#	0.324 0.810
	TOTAL					0,810
	ANNUA	L ENER = 0.8	GY SAV	11.65 (per w Day x 365 P	nit) ~9/ye = 296 k	wH/yr
•						
		= 296	KWH/20	$- \times (\beta 0.0)$	(8/KWH) = 42	0.13
	•					
)	Cost.	attache.	1)	Saving + Tuor	escent fixtures =	1,800
	****** ** ** .				عَهُ مُسْتَقِيْتُمُ مُنْ يُنْ يَنْ مِنْ مِنْ مِنْ مِنْ مِنْ مِنْ مِنْ مِ	
	raybo	CR = 1	1,80 1 20.	0 13 /yr	89.4 yrs	
			1 7 7 7		and the second s	
						
		0.13			see altached)	
						
						
						
						

DRIC D. O. CHONG & ASSOCIATES, INC.

NSULTING MECHANICAL & ELECTRICAL ENGINEERS

130-E North King Street Honolulu, Hawall 96819

Telephone (808) 847-6557

Telefax: (808) 847-6550

DATE:	א מסר). :
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-80

58. II #41.81+ 15 6 15 LHOOK KAILE.

272.90 330.20 133.02 199.53 133.62 57.30 1800 TOTAL T7-29L 0 0 Z F 6 COST 167 1011 MATERIAL (IST 1300 SHEET PRICE 186 367 151 Pool Subli HO Total C03T CHECKED BY EQUIPMENT PRICE S# 38.2 ESTIMATOR 171.90 COST 57.30 0 0 38.20 PRICE LABOR d TOTAL HRS g 4.5 . N FIE わん Virs 1,50 0,0 1.10 0. UNIT ĸ. FIXTURE ES 44 **8** QUANTITY NO OF Rabe 3 0 0 3 INSTALL NEW FLUOR 2 LAMP, SURFACE FIX. J-78, NEW 4 LAMP, SURFACE FIX. Exit fix Live Unit Type 32-II NEW SINGLE LAMP SURFACE FIXTURE DA FCRM 5418 .R, Apr 85 CONTD Remove Note NEW 4

LOCA	ATION:	REGION NO.	PROJECT NUMB	ER
PROJ	COSTS CONTION HAVE	NEW Fluor. F	IX. FISC	AL YEAR
חוצנ	LEALIS PORTION NAME	 		
ANAL	YSIS DATE	ECOHOMIC LIFE	25 YEARS	PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIGH (5.57) C. DESIGN COST (107) D. ENERGY CHEDIT CALC E. SALVAGE VALUE OF EX F. TOTAL INVESTMENT (1)	(1A+1B+1C)X.9 ISTING EQUIPMENT	1 18	0.00 9.00 0.00 11.10 1,871.10
?.	ENERGY SAVINGS (+) / COS ANALYSIS DATE ANNUAL SAV		ISCOUNTED SAV	INGS
	FUEL \$/MBTU(1) MB		fACTUR(4)	SAVINGS(5)
	A. ELEC \$ 19.93 /.0 H. DIST \$ C. RESID \$ D. NG \$ E. COAL \$ F. TOTAL		12.12	\$ 243.98 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
3.	NON ENERGY SAVINGS (+) A. ANNUAL RECURRING (+) (1) DISCOUNT FACTO (2) DISCOUNTED SAV		\$	0
	B. NON RECURRING SAVINGS \$ COST \$ (-)	GS (+) / COST (-) (+) YEAR OF ()) OCCURRENCE(2)	OISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a. \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$			\$ 5
	d. TOTAL \$C. TOTAL NON ENERGY DI	_	/ COST /-\	(302+3004) \$
	D. PROJECT NON ENERGY (1) 25% MAX NON ENERGY a. IF 301 IS = 0R b. IF 301 IS 30 c. IF 301b IS =	QUALIFICATION TEST CALC (2F5 X .33) 3C GO TO 1TEM 4 CALC SIR = (2F5	+3D1) : 1F =	\$ 80.51
4.	FIRST YEAR DOLLAR SAVIA	IGS 2F3+3A+(3B1d : YF	ARS ECONOMIC	Lire) \$ 20.13
٥.	TOTAL HET DISCOUNTED SA	(VINGS (2F5+3C)		\$ 243.98
6.	SIR (IF) PROJECT DOE	S NOT OUALIFY) (SIR)	=(5:16)=	0.13

	UNIT		ATION	7		HTINC		1	1	PER	1			PAIL			:
1	TYPE				SAV	1NGS	(w)		ملک :	Pre	AII	W)		SAVIN	GS (K	<u>ωΗ)</u>	
	32-Ⅳ	Ва	th2	<u> </u>		22				4				0.088	} }		
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	ANN	UAL E1 = 0.	12KG	J SAI	110	GS	ر <u>م</u>	er c	101:	+ //	÷	32	Κι	2H/yr		••••	:
					1		:										•¦•••
	ANN	ual Co = 3	ST SI	عبزيره	ج	Cper	uγ	(1)	-		1					:11 ° 	· · · ·
		= 3	2 kw	1/4-	× I	(110	O	68		دښH.) =	\$	2.	18			
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	(See	of new attac	hed)	Je (יטנא	<u> </u>	D.L. 1	, .t.1.2	. Tu	تا 7			- 20		• • • · · · · · · · · · · · · · · · · ·	<u></u>	 .
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			\$.é	2,18	1_1	yr'			:		· · · · · ·						
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	SIR	= 0.09	··· :-·· }				(see	· ; ·	Hac	hed)	:		• •	• • • • •	
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TORIC D. O. CHONG & ASSOCIATES, INC.
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130-E North King Street Honolulu, Hawali 96819
Telephone (800) 847-6557
Telefax: (808) 847-6550

DATE	JOH NO.:		
PROJECT NAME:		BY:	
SUBJECT:		Sht.	3-53

٥٧٠.25 ٢٠٠٢ T41.01+ 15 6 LB - 50.11. LABOUR KALIR.

10 SINGLE LAMP 1 EA 0.5 0.5 35.20 19.10 18.6 18.0	l l		י				FSTIMATOR	HE	CHECKEG BY	9756	20	
CLOIT TASK DESCRIPTION MOST WITH TOTAL LABOR EQUIPMENT TOTAL LABOR EXCEL FIX LULE 1 CA 0.5 0.5 38 20 19.00 15.1 15.1 15.1 15.1 15.1 15.1 15.1 15	INSTALL NEW FLUOR					7					5	
Task description Mo or Units Wat With Total Units	•	シト	ĬĮ,	7		ABOR		EQ	UIPMENT	ì	ATERIAL	1
Search Fixture 1 6A 0.5 0.5 3820 19.10 Search Exit Fixture 1 6A 0.5 0.5 3820 19.10 Search Exiture 1 6A 1.0 1.0 50 53820 19.10 Search Exiture 1 6A 1.0 1.0 6 6 1.50 Search Exiture 1 6A 1.50 4 0 36.7 0 Search Exiture 1 6 6 6 1.50 6 1.50 Search Exiture 1 6 6 6 1.50 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 6 1.50 Search Exiture 1 6 6 1.50 Search Exiture 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1	Unit Type 32-IV		UNIT	TIMES !	TOTAL HRS	PRICE	COST	PRICE	COST	PRICE	COST	TOTAL
Success. Exit fixture. 1 6A 0.5 0.5 38.20 19.10 JEW SINGLE LAMP. 1 EA. 1.0 1.0 1.0 1.38.20 JEW SINGLE LAMP. 1 EA. 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.	D											
JEW SINGLE LAMP, 1 EA. 1.0 1.0 38.20 IST 151 151 151 151 2 LAMP, SURFACE FIX. 0 EA 1.50 V 0 36.7 0 186	£xx3	1	EA	1	. •	38.20	19.1				1	3
Sweence Finales Sweence Finales Sweence Finales Sweence Finales Sweence Finales Sweence Finales Sweence Finales Sweence S												
JEW 4 LAMP, SLAFACE FIX. 0 EA 1.6 0 0 186												
SUBERICE FIXTURE SUBERICE FIX. 0 & A 1.50 0 0 186 0 1	NEW SINGLE LAMP.	,	EA.	7:0			8.2			151	151	189.20
Swerper Swerper Fix. O EA 1/20 O 186 O O O O O O O O O												
15W 2 LAMP, SWEACE Fix. 0 EA 1.60 0 186 0 15W 4 LAMP, SLEFACE FIX. 0 2A 1.50 V 0 367 0 15W 4 LAMP, SLEFACE FIX. 0 2A 1.50 V 0 367 0 15W 4 LAMP, SLEFACE FIX. 0 2A 1.50 V 0 367 0 10TE: Children include cost for children includes cost f							•					
1EW 4 LAMP, SURFACE FIX. 0 EA 1,50 V O 367 6 1EW 4 LAMP, SURFACE FIX. 0 EA 1,50 V O 367 0 1	2 LAMP SURFACE	0	EA	1.10			0			186	٥	S
FEW 4 LAMP, SURFACE FIX. 0									•			
Frica for fixture inclide cast for 107) Price for fixture inclide cast for 107) Price from: Lallast of saving large 1014 (15%) Price from: Lallast of saving large 1014 (15%) Say #	4 LAMP, SURFACE	0	2.A	1,50		>	0			367	9	0
ore: Protein for fixture includes cast for sales for fixtures for fixture includes cast for fixture includes cast for fixture includes saving larges Total (1871) Electronic Lallast of Roseas saving larges Total (1871)												
Price for fixture include cost for Price for 1 (107) Price for fixture include cost for 1 (107) Electronic Lallast of Raccost Savins large 1 (107) Electronic Lallast of Raccost Savins large 1 (107) Electronic Lallast of Raccost Savins large 1 (107) Fries for fixture include cost for 1 (107) Electronic Lallast of Raccost Savins large 1 (107) Electronic Lallast of Raccost Savins large 1 (107)									SuBTo		-	208.30
Price for fixture inclide cast for OIH (154.) Price formic Lallast of energy saving large ToTM (154.) Electronic Lallast of energy saving large SAM # SAM #							``		City	ડ	(10%)	20.83
Price for fixture include cast for all (154.) 31. electronic ballast of energy saving longs Total 281.7 SAY #28	NOTE:								Post)	107.)	20.83
Lallast of enough saving lands Total Z81.2	Price for fixture	7	500	9					H10	ر ۱۲	()	
SAY #28	Lallast		- 1	- 1	9	70						
SAY #28		3	\)			•		ToT	لِ		281.24
\$\frac{1}{4} \frac{1}{8}												
											SAM	1
)	
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		•										

3-84.

L0C/	CATION: RE	GION NO.	PROJECT HUM	BER
	SCRETE PORTION HAME UNIT TY			
ΑΝΛΙ	ALYSIS DATE	CONOMIC LIFE	E <u>25</u> YEAR	S PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIGH (\$.57) C. DESIGN COST (/074) D. ENERGY CHEDIT CALC (1A+1B+16) E. SALVAGE VALUE OF EXISTING B F. TOTAL INVESTMENT (1D-1E) ENERGY SAVINGS (+) / COST (-)	1C)X.9	1 / 2	0.00 5.40 3.00 91.06 291.06
۷.	ANALYSIS DATE ANNUAL SAVINGS, I	UNIT COST \$	DISCOUNTED SA	VINGS
	COST SAVINGS FUEL \$/MBTU(1) MBTU/YR(2) SAVINGS (3) FACTOR(4)	SAVINGS(5)
	A. ELEC \$20.00 0.109/unit u. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	1 \$ 2.18		<u> </u>
	F. TOTAL	\$ 2.18		\$ 26.42
3.	HOW ENERGY SAVINGS (+) / COST A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABL (2) DISCOUNTED SAVING/COS		s_ s_	0
	B. NON RECURRING SAVINGS (+) ITEM SAVINGS \$ (+) COST \$ (-)(1) OC	YEAR OF	DISCOUNT FACTOR (3)	DISCOUNTED SAV INGS (+) COST(-)(4)
	a. \$			\$
	d. TOTAL \$			\$
	C. TOTAL NON ENERGY DISCOUNTED		r) / COST (~)	(\P0BE+2VF)
	D. PROJECT NON ENERGY QUALIFICATION OF THE PROJECT NON ENERGY CALC (2) a. IF 301 IS = OR 30 CALC b. IF 301 IS = 1 GO TO d. IF 301b IS = 1 PROJECT	PF5 X .33) GO TO 11EM 4 SIR = (2F D ITEM 4	FS+3D1) : 1F :	\$ 8.72
4.	. FIRST YEAR DOLLAR SAVINGS 2F3+	-3A+(3B1d : Y	YEARS ECONOMIC	Lire) \$ 2.18
٥.	. TOTAL HET DISCOUNTED SAVINGS (2F5+3C)		\$ 26.42
6.	. SIR (IF) PROJECT DOES NOT (MALIFY) (SII	2)=(5 : 15)=	0.09

	UNIT	LOCATION	SAVINGS (W)	HRS PER DAY	DAILY SAVINGS (KWH)
	57-III	KITCHEN	26		0.104
	TOTAL	BATH		4 =	0.088
<u> </u>	1	1 ENGOCIA			
	ANNUA	= 0.192	KWH/pay x 360	5 Postyr = 70	KenH/ar
	1				
	ANNUA	COST SAV	INGS	08 /KWH) = # 1	1 71
		70 λωπ	147 1 (470, 00	00 / AUH) - H	<u> </u>
ma ja tuala aranga					:::::::::
	Cost t	or new ever	y savings thus	or fixtures = 1	4 610
		macheal			
)	Paybac	k = # 61	0 =	128.2 yrs	
		44	16 1yr		
	• • • • • • • • • • • • • • • • • • •				
	SIR =	0.09	(Sae	attached)	·
				,	
					· · · · · · · · · · · · · · · · · · ·
		1			

CEDRIC D. O. CHONG & ASSOCIATES, INC.
ISULTING MECHANICAL & ELECTRICAL ENGINEERS
D-E North King Street Honolulu, Hawaii 96819
Telephone (800) 847-6557
Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 3-86

		QUANTITY	TITY			ABOR		ដ	EQUIPMENT	2	MATERIAL	
Unit Type ST. III.	·	NO OF UNITS	UNIT	HH	TOTAL	PRICE	COST	PRICE	. cost	PRICE	COST	TOTAL
0												
Remare Exet fix three		1	EA	0.5	1.0	38.20	38.20					38:20
- 1		1	V	-	2		,			101	Į,	,
NEW SINGLE LAMP				0:	•		00.00			2	/5/	9/18/
1							•					
NEW 2 LAMP, SURFACE FIX	F FIX.	/	£4	1.10	1.10		42.02			186	981	228.02
									•			
NEW 4 LAMP, SURFACE	FIX.	0	2A	1,50	0	>	0			367	0	0
•												
									Subto	JA.		455.42
							`		CIAN	150	(107.)	45.54
NoTE:						•			P 25	((ه	2)	45.54
a) Prices for fixture	Inc/	de	S	1 PC					H/0	(157.		68.31
honic Lalla	p +3	2000	্	, VIn S	9	J'a						
		0	<u> </u>	7					TOTAL			614.81
											SAY	77°
						•						
		-										
3-												
8												

LOC/	\T10!!:		RCC	SION NO	PROJECT N	UMBER	
PROJ	ECT TITLE	INSTA	L NEW	Fluor.	<i>FIX.</i> F	ISCAL YEAR	
ANAL	YSIS DATE_		co	CONOMIC LIF	E <u>25</u> YE	ARS PREPARED I	3Y
	INVESTMENT A. CONSTRI B. SIGH (C. DESIGN D. ENERGY E. SALVAGI F. TOTAL ENERGY SAV	JCTION COS 5.5.7) COST (/ CHEDIT CA E VALUE OF INVESTMENT	o 7.) LC (1A+1B+1C EXISTING EC (1D-1U)	1) X. 9 Tramentuç	1.	(0/0.00 33.35 (1.00 (34.10	<u>(34.1</u> 0
۲,			SAVINGS, U	IT COST \$	DISCOUNTED	SAVINGS	
						DISCOUNTED) SAVINGS(5)	
	A. ELEC B. DIST C. RESID D. NG E. COAL	\$ 19.92 \$ \$ \$ \$	0.239/unit	\$ 4.7C	12.12	\$ 57.69 \$ \$ \$	
	F. TOTAL			s <u>4.76</u>	<u>)</u>	£ 57.	69
3.	Λ. ΑΝΝΌΑL	RECURRING	+) / COST (i (+/-) CTOR (TABLE SAVING/COST	1))	\$ <u> </u>	
	E. NON RE ITEM	CURRING SA SAVINGS COST \$	VINGS (+) / ; \$ (+) Y (-)(1) OCC	COST (-) EAR OF URRENCE(2)	DISCOUNT FACTOR (3)	DISCOUNT INGS (+) C	ED SAV- OST(-)(4)
	a b c d. TOT	\$\$ \$\$!AL \$				\$ \$ \$	
	C. TOTAL	NON ENERGY	r DISCOUNTED	SAVINGS (+) / COST (-	-) (3A2+3Ba4)	\$
	(1) 25% IM a. If b. If c. If	X NON ENCS 7 30) IS = 7 30) IS 7 30)b IS =	RGY QUALIFIC RGY CALC (2F OR 3C GO 3C CALC = 1 GO TO 1 PROJECT	S X .33) TO ITEM 4 SIR = (2) ITEM 4	F5+3D1) : 1	\$ 19.04	•
4.	FIRST YEAR	R DOLLAR SA	AVINGS 2F3+3	IA+(3B1d:	YEARS ECONO	MIC LIFE) S_	4.76
٢.	TOTAL HET	DISCOUNTER	D SAVINGS (2	15+30)		s <u>57</u>	.69
6.	SIR (IF	1 PROJECT	DOES NOT QU	IALIFY) (SI	R)=(5 : 1F)	= 0.09	

7	UNIT LOC		البرا با		DAILY SAVINGS (KWH)
		rchen.	48	4	0.192
٤,5	7-70				
	ANNUAL EN	ERGY SAVING	2S	das/yr = 70 K	el I
	ANNUAL CO.	= 70 kwH/y	-x (\$0.0	68/KWH) = \$ 4	L.76
	ost of new (see attache	energy saving d)	a fluor, fixt	wes = \$ 610	
	Payback =	\$ 610	= 12	28.2 yrs	
		\$ 4.76 1	yr.		
	SIR = 0.0	9	(sec	attached)	

SULTING MECHANICAL & ELECTRICAL ENGINEERS
0-E North King Street Honolulu, Hawaii 96819
relephone (804) 847-6557 Telefax: (808) 847-6550

DATE:	JOH NO	o.:
PROJECT NAME:		BY:
SUBJECT:		Sht. 3-89

CHOUR KATIE . #41:81+ 15 10 LB = 58 " 547 38:20

TAS DICLE MELLY THEORY TOTAL WITH THOSE TOTAL TOTAL WITH THE COST PRICE PRIC			1				FCTIMITOR	J. P. C. P. C.	כאניגנים אא	מאכני ב	i c	
ACE FIX. 1 EA 1.50 1.00 188.20 188.2 188.2 188.2 189.2	INSTALL NEW FLUOK	,	72/2/			1	10.00.00				5	
### 2 EA 0.5 1.0 38.20 38.20	TASK DESCRIPTION	MO OF UNITS	UNIT	HA	TOTAL	1	COST	PRICE	COST	UNIT PRICE	COST	TOTAL
2 EA 0.5 1.0 38.20 3	0											
FACE FIX. 1 EA 1.10 1.10 38.20 151 151 189.3 FACE FIX. 0 EA 1.50 V O 36.7 O O SUBTOTICL 455. LAR. include Cast for 100 1 Cont. 100 100 100 100 100 100 100 100 100 10	Exct	7	EA	0.5		38.20	38.					7
FACE FIX. 1 EA. 1.0 1.0 : 38.20 151 151 189. EACE FIX. 0 2A 1.60 1.10 42.02 367 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0												
FACE FIX. 1 EA 1.10 1.10 42.02 186 186 228. ACE FIX. 0 £A 1.50 V O 367 0 O SUBTOTION 455. Love include Cas for book of the cas for the c	NEW SINGLE, LAMP		£A.	~			١.			151	151	10
FACE FIX. 1 EA 1.10 1.10 42.02 186 228. ACE FIX. 0 EA 1.50 V O 367 0 O Subject TAL 455. Lose includes cost for O O O O O O O O O O O O O O O O O O O	SURFACE FIXTURE											
FACE FIX. 1 EA 1.10 1.10 42.02 186 228. ACE FIX. 0 £A 1,50 \ 0 \ 0 \ 36.7 \ 0 \ 0 \ 0 \ 36.7 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \	Į :						·			·		
ACE FIX. 0 2A 1,50 \$\sqrt{0}\$ 0 \$\frac{367}{367}\$ 0 \$\sqrt{0}\$ Substitute 1 \$\frac{465}{16}\$ \left \frac{1}{16}\$ \left \frac{455}{16}\$ \left \frac{1}{16}\$ \left \fra	2 LAMP SURFACE	/	EA		~		ó			186	981	0
ACE FIX. 0 2A 1,50 \$\sqrt{0}\$ 0 \$367 0 0 \$40.00									•			
Los includes cast for 617 cast for 68	4 LAMP,	0	2A	1,50		\rightarrow	0			367	0	0
Los includes cast for a cast for the cast fo												
Lue include cost for relating the first of the cost for relating t									SUB	l	. 7	455.42
was includes cast for OIH (152) 45. Mast of 200 cyling land ToTAL (614.							•		617	2		45.54
Live include cast for large of (187) Allast of large large to Tath (6									PR	2	(%01)	ts.24
Mast of eacy seving lands 77772 (614.	Prices for fixture in	"de	5	J4 1					_		5.7.)	68.31
62 U Tether 614.	honic ballast	2000		1	0	20						
SAY #6		9		i			•			747		6 14.81
3 Aγ 4 A Δ A Δ A Δ A Δ A Δ A Δ A Δ A Δ A Δ A												
											SAY	(5
					,	•			i			
•									•			
	•											
		•										

3-90

LOCAT	ATION: REGIO		PROJECT NUME	BER
PROJE	PECT TITLE INSTACE NEW F	luor. F	IX. FISC	CAL YEAR
DISCR	PRETE PORTION HAME Unit Type &	57-型,57) - III 	
ANALY.	YSIS DATEECON	OMIC LIFE	25 YEARS	PREPARED BY
ר ה ה ד	INVESTMENT COSTS A. CONSTRUCTION COST B. SIGH (5.5%) C. DESIGN COST (70%) D. ENERGY CHEDIT CALC (1A+1B+1C)X E. SALVAGE VALUE OF EXISTING EQUIF. F. TOTAL INVESTMENT (1D-1E)	(, 9	\$ 610 1 33 1 6	.00 .55 .00 34.10 (34.10
	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT		SCOUNTED SAY	/INGS
	FUEL S/MUTU(1) MUTU/YR(2) S	(E) SDHIVAS	fACTUR(4)	SAVINGS(5)
E D F V	A. ELEC \$ 19.92 0.239 Jun. 1 \$ B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	4,76		1
F	F. TOTAL	: 4.76		<u> 57.69</u>
	MON ENERGY SAVINGS (+) / COST (-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE 1 (2) DISCOUNTED SAVING/COST (3)			<u> </u>
1	B. NON RECURRING SAVINGS (+) / CO ITEM SAVINGS \$ (+) YEAR COST \$ (-)(1) OCCUR	RENCE(2) F	FACTOR (3)	DISCOUNTED SAY- INGS (+) COST(-)(4)
	a\$ b\$ c\$ d. TOTAL \$			\$ \$ \$\$
	C. TOTAL HON ENERGY DISCOUNTED S	AVINGS (+)	/ COST (-)	(3A2+3Bo4) \$
	D. PROJECT NON ENERGY QUALIFICAT (1) 25% MAX NON ENERGY CALC (2FS a. 1F 301 15 = OR 3C GO T b. 1F 301 15 = O CALC c. 1F 301b 15 = O GO TO 1T d. 1F 301b 15 O PROJECT DO	X .33) O ITEM 4 SIR = (2FS EM 4	+3D1) : 1F =	<u>\$ 19.64</u>
4.	FIRST YEAR DOLLAR SAVINGS 2F3+3A+	(381a : Yr.	ARS ECONOMIC	Life) \$ 4.76
٢.	TOTAL NET DISCOUNTED SAVINGS (200	+30)		\$ 57.69
6.	SIR (IF 1 PROJECT DOES NOT QUAL	IFY) (SIR)	=(S: 1F)=	0.09

UNIT LOCATION LIGHTING HRS PER DAY DAILST TYPE					
TYPE SAVINGS (W) MOFRATION SAVINGS (KWH) (40-I KITCHEN 52 4 0.208 ANNUAL ENERGY SAVINGS = 0.208 KWH/day x 365 (2)/2 = 76 KWH/y ANNUAL COST SAVINGS = 76 KWH/y x (\$0.068 EWH) = \$\$5.17 Cost of new energy savings fluor fixtures = \$\$670 Payback = \$\$670 = 130 yes	UNIT	LOCATION	LIGHTING	HRS PER DAY	DAILE
ANNUAL ENERGY SAVINGS = 0.208 kull/day × 365 mg/z = 76 kwl/y ANNUAL COST SAVINGS = 76 kwll/gx × (\$0.068 kwll) = \$5.17 Cost of new energy savings fluor. fixtures = \$670 Payback = \$670 = 130 yrs	 				
ANNUAL ENERGY SAVINGS = 0.208 kull/day × 365 mg/z = 76 kwl/y ANNUAL COST SAVINGS = 76 kwll/gx × (\$0.068 kwll) = \$5.17 Cost of new energy savings fluor. fixtures = \$670 Payback = \$670 = 130 yrs	107	Vitalia	53		0 208
ANNUAL COST SAVINGS = 76 kwH/gr × (\$0.068 kwH) = \$5.17 Cost of new energy savings fluor. fixtures = \$670 Payback = \$670 = 130 yrs \$5.17 lyr	00-1	KIICHEN	.		70.208
ANNUAL COST SAVINGS = 76 KWH/yr × (\$0.068 kwH) = \$5.17 Cost of new energy savings fluor. Fixtures = \$670 Payback = \$670 = 130 yrs \$5.17 lyr					
ANNUAL COST SAVINGS = 76 KWH/yr × (\$0.068 kwH) = \$5.17 Cost of new energy savings fluor. Fixtures = \$670 Payback = \$670 = 130 yrs \$5.17 lyr	Δολούλοι	CISPCU CA	1,1,1,2,5		
ANNUAL COST SAVINGS = 76 kwH/yr × (\$0.068 kwH) = \$5.17 Cost of new energy savings fluor. fixtures = \$670 Payback = \$670 = 130 yrs	TANKAL.	= 0.208	kuH/day × 36	05 day /yr = 76	KWH/y
Cost of new energy savings fluor. Anteres = \$670 Payback = \$670 = 130 yrs			<i>J</i>	0	0
Cost of new energy savings fluor. Anteres = \$670 Payback = \$670 = 130 yrs	ANNUAL	COST SAVIN	GS X (\$0.00	7 /t/u) = \$ 5	
Payback = \$ 670 = 130 ycs			3		
Payback = \$ 670 = 130 ycs			0)]	
	 Cost of	new energy s	lavings + luor. ti	ixures = # 670	
	Paybac	k = \$ 670	}	130 yes	
SIR = 0.09 (see a Hached)	<i></i>	\$ 5.1	7 19	<u> </u>	
	SIR =	0.09	(se	u allached)	
	<u> </u>				<u>;</u>
	-				
					1

EDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawall 96819 Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JON No.:	
PROJECT NAME:	 	BY:
SUBJECT:		Sht. 3-92

(- ABOR RATE: \$21.31+757, LB = 38.

						ר ר					
PROJECT NSTALL NEW FLUOR	FIXTURE S	5321				ESTIMATOR	CHE	СНЕСКЕО ВҮ	SHEET	OF	S
		TITY		ا ر	LABOR		EQ	EQUIPMENT	ž	MATERIAL	
Unit Type 60-IL	NO. OF UNITS	UNIT	¥ .	TOTAL HRS	UNIT	C03T	PRICE	COST	PRICE	COST	TOTAL
. 0.											
Remove Exit Fixture	7	EA	0.5	0.1	38.22	38.20					38.20
NEW SINGLE LAMP	O	EA.	0.7	0		0		٠	121	0	0
W											
						•					
NEW 2 LAMP SURFACE FIX.	4	£4	1.10	2.20		84.04			186	372	40.954
								*			
NEW 4 LAMP, SURFACE FIX.	0	£4	1,50	0	\rightarrow	0			367	0	0
					`	-					
								Sud	OTA		494.24
								616	S	ST (107.)	49.42
NOTE:					•			PR0		10%)	49.42
1) Prices for fixture incl	de	25	- BC					0/4	.51)	<u></u>	71.47
electionic ballast of	2020	52 53	1100	9	70						
	9	<u> </u>	\bigcirc			•		ToT	AC		(G 7.22
										SAY	\$ 670
					-						
								•			
										•	
•	-										
DA FORM 5418-R, Apr 85 CONTD											

3-93

LOCAT	TION:REGI	ION NO P	ROJECT NUMB	ER_
PROJE	ECT TITLE INSTALL NEW	Fluor. Fl	X. FISC	AL YEAR
DISCF	RETE PORTION NAME Un. + Type C	0-I		
ANALY	YSIS DATEECO	DHOMIC LIFE	25 YEARS	PREPARED BY
,, (((INVESTMENT COSTS A. CONSTRUCTION COST B. SIOH (\$-57) C. DESIGN COST (/07.) D. ENERGY CHEDIT CALC (IA+IB+IC) E. SALVAGE VALUE OF EXISTING EQU F. TOTAL INVESTMENT (ID-IE))X.9 JIPMENT	5 6	.00 6.85 7.00 6.47 5
	ENERGY SAYINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAYINGS, UN	IT COST \$ DIS	SCOUNTED SAY	INGS
F	COST SAVINGS FUEL \$/MBTU(1) MBTU/YR(2)	VHHAVE (7)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
1	A. ELEC \$ 19.96 0.259/unit B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	\$ 5.17 \$ \$ \$		\$\$
!	F. TOTAL	s <u>5.17</u>	•	s 62.66
	HON ENERGY SAVINGS (+) / COST (- A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE (2) DISCOUNTEO SAVING/COST	1)	\$_ \$_	0
	B. NON RECURRING SAVINGS (+) / ITEM SAVINGS \$ (+) YE COST \$ (-)(1) OCCU	COST (-) AR OF D RRENCE(2) F	ISCOUNT ACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a. \$			\$ \$ \$ \$
	C. TOTAL NON ENERGY DISCOUNTED	SAVINGS (+)	/ COST (-)	(3A2+3Bo4) \$
	D. PROJECT NON ENERGY QUALIFICA (1) 25% MAX NON ENERGY CALC (2F5 a. IF 3D1 IS = OR 3C GO b. IF 3D1 IS 3C CALC c. IF 3D1b IS = 1 GO TO 1 d. IF 3D1b IS 1 PROJECT E	TION TEST X .33) TO ITEM 4 SIR = (2F5+ TEM 4 DOES NOT QUAL	3D1) : 1F =	<u> 20.68</u>
4.	FIRST YEAR DOLLAR SAVINGS 2F3+3/	.+(3B1d : YFA	RS ECONOMIC	LIFE) \$ 5.17
۶.	TOTAL NET DISCOUNTED SAVINGS (25	·5+3C)		\$ 62.66
6.	SIR (IF 1 PROJECT DOES NOT OUT	LIFY) (SIR)=	(5: 15)=	0.09

	//			Une see Day
	UNIT L TYPE		LIGHTING SAVINGS (ω)	HRS PER DAY DAILY IN OPPRATION SAVINGS (KWH)
	60-II	KITCHEN BATH	20.	4 0.088
	TOTAL			= 0.192
	ANNUAL	ENERGY SAVIN	165 11da y 305	day/yr = 70 kwH/yr
	ANNUAL	COST SAV N	5S	70 800,754
		= 70 kwH/yr	× (\$0,06	8 17,) = #4.76
		• •		?xtures = \$ 610
:				
				128.2 yrc
	SIR = 0.			see allached)
		,		

EDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawaii 96819 Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:		
PROJECT NAME:	<u> </u>	BY:	P
SUBJECT:		Sht.	3-95

(ABOR RATE: \$21.81+757, LB = 38.

	ł					,					
PROJECT INSTALL NEW FLUOR		FIXTURES		7		ESTIMATOR	CHE	CHECKED BY	SHEET	OF	Sincers
	QUANTII	TITY		اد	LABOR		EQ	EQUIPMENT	ž	MATERIAL	
TASK DESCRIPTION	NO. OF UNITS	UNIT	KH.	TOTAL HR3	PRICE	COST	PRICE	COST	PRICE	cost	TOTAL
θ.											
Remove Exst Fixture	7	EA	5.0	/.0	38.20	38.20					38:20
NEW SINGLE LAMP	,	£4.	7.0	1.0		38.20		•	151	151	189.20
SURFACE FIXURS											
		•				•					
NEW 2 LAMP SURFACE FIX.	/	EA	1.10	1.10		42,02			186	981	228.02
1								ď			
NEW 4 LAMP, SUFFACE FIX.	0	2A	1,50		->				367		0
-											
								Suie	4707		455.42
								75	2	ST (102.)	
- 1								PR	SPIT PET	(107)	45.54
a) Prices for fixture incl	1 de	383	797					0	H	(151)	68.31
electronic ballast d	2020	25 6	1115	8	Jo						
	9	_	7			٠		70	TAL		18.719
										SAY	# 610
								•			
	-										
						-					
DA FORM 5418-R, Apr 85 CONTO						·					

3-96

FOCV	ATION:	REGION NO.	PROJECT NUM	BER
PROJ	JECT TITLE INSTALL NEC	W Fluor. 1	CIX. FIS	CAL YEAR
DISC	CRETE PORTION NAME	pe 60-II		
ANAL	LYSIS DATE	ECONOMIC LIFE	25 YEAR	S PREPARED BY
	INVESTMENT COSTS A. CONSTRUCTION COST B. SIGH (5.5%) C. DESIGN COST (10%) D. ENERGY CHEDIT CALC (1A+18 E. SALVAGE VALUE OF EXISTING F. TOTAL INVESTMENT (1D-18)	B+1C)X.9 DEQUIPMENT	\$ <u>(1</u>	.00 .55 .00 34.10 .34.10
?.	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS,) , UNIT COST \$ D	ISCOUNTED SA	VINGS
	COST SAVINGS FUEL \$/MBTU(1) MBTU/YR((2) SVAINC2(3)	FACTOR(4)	SAVINGS(5)
	A. ELEC \$ 19.92 0.239/u B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	1 1 1		\$ \$ \$
	F. TOTAL	s 4.76		\$ 57.69
3.	NON ENERGY SAVINGS (+) / COST A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TAIL (2) DISCOUNTED SAVING/C	RIE 11	\$_ \$_	0
	B. NON RECURRING SAVINGS (+ 1TEM SAVINGS \$ (+) COST \$ (-)(1)) / COST (-) YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a\$			\$ \$ \$
	C. TOTAL NON ENERGY DISCOUN	TED SAVINGS (+)) / COST (-)	(3A2+3Ba4) \$
	D. PROJECT NON ENERGY QUALI (1) 25% MAX NON ENERGY CALC a. IF 3D1 IS = OR 3C b. IF 3D1 IS 3C CALC c. IF 3D1b IS = 1 GO d. IF 3D1b IS 1 PROJE	(2F5 X .33) GO TO ITEM 4 SIR = (2F! TO ITEM 4	5+3D1) : 1F :	\$ 19.04
4.	FIRST YEAR DOLLAR SAVINGS 2F	3+3A+(3B1d: YF	EARS ECONOMIC	Life) \$ 4.76
٢.	TOTAL HET DISCOUNTED SAVINGS	(2F5+3C)		\$ 57.69
6.	SIR (IF) PROJECT DOES NOT	OUALIFY) (SIR)=(5 : 1F)=	0.09

	UN	JT.		<u>_</u>	06	AT/	OL			1G	HTI	NG			1R	<u> </u>	R	Day			D	A 11_5	1		
***************************************	TY	PE								AV	/N(źS((w)		M	OP	r R.	ΔΙ	W)		SA	אוא	<u>رح (</u> :	KWH)	_
	60	Ш		-	K	TC	HEY]			2.0	و					4				0	./0	4	1	- 4.
	:	<u> </u>	:						•				· · · · ·			:					:	<u>:</u> : ::			
			! A.1		 	06	4	ζ Δι	//^\	رم ر <i>ر</i>				-					1		<u>.</u> 			· ;	
	AN	رب <u>.</u> :	ب.	بي :	= .	0	./c	4	Łω	'/a	ay.	×	30	55	da)/y		=	38	3 K	البذ	lyr			 .
	A٨	NUX	<u></u>	<u>.</u>	o \$	Τ.,	SAY	אוא	2ي					•)				; ;,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	} V		: ::			; .	
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	رم (د	st.	ot a	Ha	ew. ch	وم) دم)	e	3)	sa	zin.	g. J	اس	٠٠٧	坮	xti	بح	\$	=	#	33	30		· · · · · · · · · · · · · · · · · · ·		
	Pa	ارب	20.	ck.	=		#	3	30	2	1			=		2	1.9	. u	13			· · · ·			
	_ ;	<u>-</u>		• 19		•	: :		:	! 	!				·		: 4	•		 			······································		• •
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EDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawaii 96819 Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:	BY:	
SUBJECT:	sht. 3-97	- -

480R RATE: \$21.81+757, LB = 38.

PROJECT INSTALL NEW FLUOR	١.	FIXTURESS				ESTIMATOR	GHE	CHECKED BY	SHEET	P	ر بانجار ر
		TITY		اد	ABOR		E Q	EQUIPMENT	À	MATERIAL	
TASK DESCRIPTION	MO OF UNITS	UNIT	F Like	TOTAL HAS	UNIT	COST	PRICE	COST	PRICE	COST	TOTAL
† ·											
Remove Exst Fixture	7	6A	0.5	0.5	38.20	19.10					11.10
NEW SINGLE LAMP	0	EA.	7.0		·	0		·	151	0	0
SURFACE FIXTURE											
NEW 2 LAMP, SURFACE FIX.	/	£A	1.10	1.10		42.02			781	981	228.02
NEW 4 LAMP, SURFACE FIX.	0	2A	1,50		->				367		0
								JATUTAL	746		247.12
-								4174	C057	(107.)	24.71
NOTE:								PRO		(102)	24.71
a) Prices for fixture incl	Idea	585	78-7					0/14		(%	37.07
electronic hallast d	2000	- 31	1111	9	Ja						
	9)					707	AL	١.	333.61
										542	\$ 330
					•						
-								٠			
•											
	•										
DA FORM 5418-R, Apr 85 CONTD			•								

3-99

LOCATION:			
PROJECT TITLE INSTALL N	FW Fluor. F	IX. FISC	AL YEAR
PROJECT TITLE INSTALL NO DISCRETE PORTION NAME	·Τ ΤΥΡΕ 60-II	<i></i>	
ANALYSIS DATE	ECONOMIC LIFE	25 YEARS	PREPARED BY
1. INVESTMENT COSTS A. CONSTRUCTION COST B. SIGH (5.5%) C. DESIGN COST (10%) D. ENERGY CHEDIT CALC (1A+ E. SALVAGE VALUE OF EXISTS F. TOTAL INVESTMENT (1D-18) 2. ENERGY SAVINGS (+) / COST (-18+1C)X.9 NG EQUIPMENT :)	\$ 330 \$ 72 \$ 3 \$ 36	0.00 3.15 3.00 43.04 3.43.04
 ENERGY SAVINGS (+) / COST (ANALYSIS DATE ANNUAL SAVING 			
FUEL S/MBTU(1) MBTU/1			
A. ELEC \$ 19.85 0.130 H. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	Junit \$ 2.58	<u>/2./2</u>	\$ 31.27 \$ \$ \$ \$
F. TOTAL	\$2.58		\$ 31.27
3. HON ENERGY SAVINGS (+) / CO A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR ((2) DISCOUNTED SAVING		\$_ \$_	0
B. NON RECURRING SAVINGS 1TEM SAVINGS \$ (+) COST \$ (-)(1)	YEAR OF		DISCOUNTED SAV- INGS (+) COST(-)(4)
a. \$ b. \$ c. \$ d. TOTAL \$			\$ \$ \$
C. TOTAL NON ENERGY DISCO	UNTED SAVINGS (+)	/ COST (-)	(3A2+3Da4) \$
D. PROJECT NON ENERGY QUA (1) 25% MAX NON ENERGY CAL a. IF 3D1 IS = OR b. IF 3D1 IS = 3C CAL c. IF 3D1b IS = 1 G d. IF 3D1b IS 1 PRO	C (2FS X .33) 3C GO TO ITEM 4 C SIR = (2FS O TO ITEM 4	+3D1) : 1F =	<u>10.32</u>
4. FIRST YEAR DOLLAR SAVINGS	2F3+3A+(3B1d : YF	ARS ECONOMIC	LIFE) \$2.58
S. TOTAL NET DISCOUNTED SAVIN	GS (2F5+3C)		s <u>31.27</u>
6. SIR (IF) PROJECT DOES N	OT QUALIFY) (SIR)	=(5 : 1F)=	0.09

Electronic Ballast Technology represented by Inter-Island Fet. Industrial

EBT Ballast Guide

RAPID START BALLAST (Series Connection)*

LAMPS	LAMPTYPE	LAMPLENGTH	LAMPWATTS	INPUTVOLTS	LINEAMPS	INPUTWATTS	ORDERING CODE
	F40T12/RS		40	120	タイル・25 Am - 19432 Am	- 128 . € & / - 128 . € & /	SSB1-120-1/40
			340 mg	277	作品を11分割を を20年213年を表	न्यू में 28 वर्तन्त्र सम्बद्ध	\$SBJ 277-1/40 1
	5.05.0D0		34 40	120	.50 .61	57 69	SSB1-120-2/40
2 (1)	F40T12/RS	4'.	34 40	277	.21 .27	57 6 9	SSB1-277-2/40
2	F032T8/RS		32	120		62	SSB1-120-2/32 SSSB1-277-2/32
<u>88 (4) .</u>	THE COLUMN TWO IS NOT THE COLUMN TWO IS NOT	They be the by	34 40	120	.64 .74	72 84	SSB1-120-2/40MP
2 (1)	F40T12/RS	4'	34 40	277	.27	72 84	SSB1-277-2/40MP
	建安徽 60		34 75	120	52 53 64 64 %		-55B1:120-2/40MII
	F40T12/R5		34 2,7	277	28 28	्राच्या विकास	6SB1-277-2/40MII
. 2	F025T8 - F032T8 - F032T8	3'.''	25 · 3.	120.		51=3=5 - 64	SSB1-120-2/32MI
	F025T8	- '/3'	25	277	.20	51 x \$25 0 164 - 382	SSB1-277-2/32MII
1 - 12 - 12 - 12 - 12 - 12 - 12 - 12 -	(一种)	\$3.	34 40	120	.80 .93	90 105	SSB1-120-3/40
3 (1)	F40T12/RS	4	34 40	277	.34	90 105	SSB1-277-3/40
3 (2)	F032T8/RS	4'	32	120 277	.82 .35	92	SSB1-120-3/32 SSB1-277-3/32
			- 5.95 - 110 seas		5 -54 45 FM	160% and	SSB1 120-2/96H0
2.5	F96T12/HO	18		1277	19-14-15 - 183 - 1854	1603	SSB1 277-2/96HO

INSTANT START BALLAST (Parallel Connection)**

	F025T8	3'	25		.48	52 ·		
	F032T8	4'	32	120	.59	66	SSB2-120-3/32IS	
5	F040T8	5′	40		.71	80 .		
2	F025T8	3'	25		,21	52		
	F032T8	4'	32	32 277		66	SSB2-277-3/32IS	
	F040T8	5'	40		.31	80		
	F025T8	3 87	25 7		360	67	The Market Market	
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LOW VOLTAGE POWER SUPPLY

- * All SSB1 series ballasts are normal rapid start.
- ** All SSB2 series ballasts are instant start.
- † MINI-BALLAST (1.15"H x 1.68"W x 9.2"L)
- (1) Also compatible with F40T12/32W, 3" and 6" "U" tube (40W & 34W) and F30T12/RS 30W & 25W lamps.
- (2) Also compatible with F025T8 and F040T8 lamps.
- (3) Also compatible with F60, F64, F72 and F84T12/HO lamps.
- (4) Also compatible with F017T8 lamps. Can be substituted in place of 3 lamp.
- (5) Also compatible with F60, F64, F72 and F84T12IS lamps.

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<u> </u>	balla	sts. Exis	ting in	cadescent lial	t fixtures can be	
	filled	with the	oresten	t retrofit ada	ptus.	
	<	Section	3. 2	Replace Incap	escent lighting a	~d
		Section	3.3	Energy Conser	lescent Lighting a ving Fluorescent l	-ight
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3. 5	Use	more Effi	cient 1	lighting Source		
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CEDRIC D. O. CHONG & ASSOCIATES, INC.
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Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:		
PROJECT NAME:	BY:		
SUBJECT:	Sht. 3-1	02	

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SUBJECT:

Sht. 3-103

Telephone (808) 847-6557 Telefax: (808) 847-6550

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SUBJECT: Sht. 3-104

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SUBJECT:

Sht. 3-105 01

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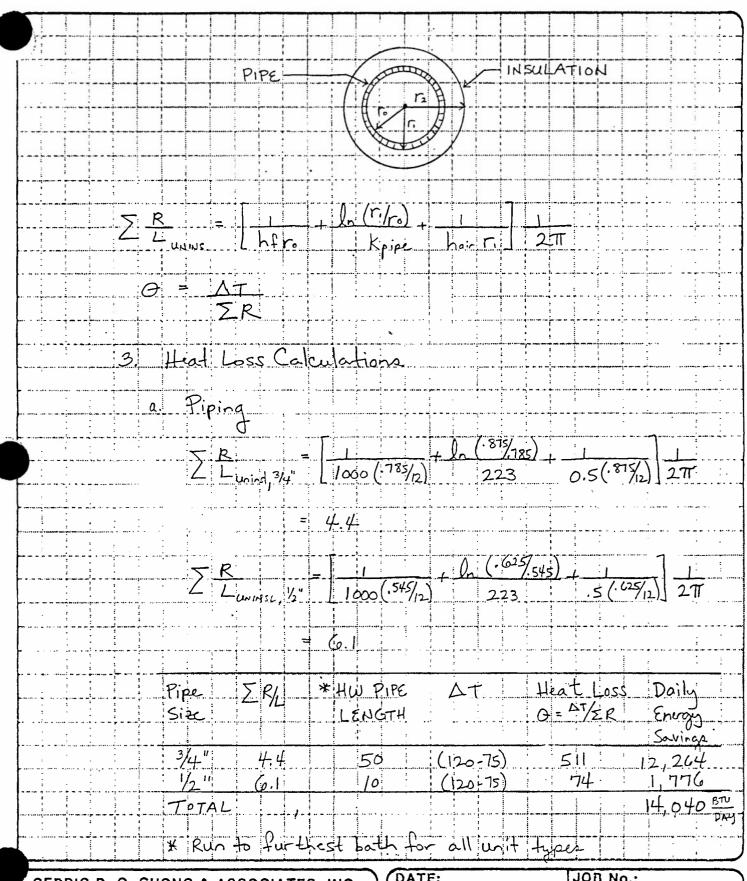
PROJECT NAME: BY:

SUBJECT: Sht. 4-1

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DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-2



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DATE:	JON NO	•:	
PROJECT NAME:		BY:	•
SUBJECT:		Sht.	4-3

b	water Heater Storage	
	Tank Size = 22" \$ x 5'-0"	
	u = 1/R = 1/6 = 0.06	
		TUH/F-SF × [120-75]
	= 78 BTWH x 24 HR/Day	
4.	Evaluate Heat Loss	
	Total Heat Loss = [1,872 + 14,0	40] = 15 912 BTL/Day
	ANNUAL ENERGY SAVINGS = 15,912 BTU/Day x 365 [
	OR 5.81 MBTU/yr = 1 (3413 BTUH/kw)(3.0)	•
	ANNUAL COST SAVINGS = 507 Kully, x (\$0.00	
	Cost for Instantaneous EWH's: (see attached)	
	Payback = \$ 1424 = 36.9 \$ 38.56	yrs
	SIR = 0.11	ce allached)
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DATE:	JOB No.:		
PROJECT NAME:		BY:	
SUBJECT:	 · · · · · · · · · · · · · · · · · · ·	Sht.	4-4

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Since this analysis was done for the worst case of non-insulated lines and the longest piping		h	eah	ی خر	س	oul	d	No	_	بما	· ·	6	+2	e-	CC.	. C.	hiv	٠.	<u>}</u>			: -\			
Since this analysis was done for the worst case		بر ۲۱	ι	Дn. Н	ті Са	ጥ - ሌ	ا یں د محط	0	ے دع	Lin	ر مرد م	<u> </u>	يري ميل	u. Lt	بي. in	e st	ile."	15	مر میر	ماده	ا .م ا	wd	Lv		
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be cost effective.							i i		i				: : : :			,								-	
		<u>Þ</u> e	- C	Do	+	بع	صلا	٦	ti.k	e.															
Installing Instantaneous water heaters would not be cost effective.		In.	stall	ina.	1	ns	ta	n-l	an	ام	ـما	w	Ls	<u>ر</u>		eas	ارد	2ر	ياه ديا	ياط	h	<u>ا</u> ۾			

SUBJECT:

Sht. 4-5 Of

Telephone (808) 847-6557 Telefax: (808) 847-6550

EETS 423.88 833.40 170.36 6 75.56 139.11 130.15 TOTAL 1424 =3 MATERIAL TA ## T (10%) COST (15%) K SUBTOTAL \widetilde{Z} PROFIL 101 UNIT PRICE SHEET # 0 675.00 38.80 70 COST CHECKED BY EQUIPMENT 20 UNIT 19.50 0.57 675 3.58 38.24 136.76 158.40 79.45 ESTIMATOR COST 39.60 38.20 UNIT LABOR 2.08 TOTAL HR3 M 39. .055 ω 5 Ö UNIT MEA3 SA S. F. QUANTITY ~ 86 2.60 MO. OF UNITS 65 † 122.00nstantaneous Water Heater 5. LABOR RATE: rddas TASK DESCRIPTION DA FORM 5418-R, Apr 85 CONTO 3/4" MOX Sick (3 apr 10 #

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+ 10:11:

							BER
PROJ	ECT	TITLE	Instant.	aneous	EWH	FIS	CAL YEAR
DISC	RETE	PORTI	ON NAME				
ANAL	YSIS	DATE		E0	ONOMIC LIFE	IS YEAR	S PREPARED BY
	Λ. Β. C. D. Ε.	CONSTR SIOH DESIGN ENERGY SALYAC	COSTS RUCTION COST (5.5%) COST (10 COREDIT CAL GE VALUE OF INVESTMENT	ヴィ) _C(1A+1B+10 _EXISTING_E(C)X.9 DUIPMENT	\$ 1,2 \$ \$ \$	124 78 142 -80
				COST (-) SAVINGS, UN	IIT COST \$ DI	SCOUNTED SA	VINGS
			\$/MBTU(1)	MBTU/YR(2)	ANNUAL \$ SAVINGS(3)	FACTOR(4)	SAYINGS(5)
	A. E B. D C. R D. N E. C	LEC IST ESID IG	\$ 6.64 \$	5.81	\$ 38.56 \$ \$ \$ \$	9.32	\$ 359.38 \$ \$
	F. 1	OTAL			s <u>38.56</u>		\$ 359.38
3.	Α.	ANNUA (1) (2)	L RECURRING DISCOUNT FA DISCOUNTED ECURRING SA SAVINGS	SAVING/COST VINGS (+) / S (+) Y	1) (3A X 3A1) ⁻ COST (-) EAR OF	DISCOUNT	O DISCOUNTED SAV-
			COST \$ \$ 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		URRENCE(2)	FACTOR (3)	INGS (+) COST(-)(4) \$ 5 5 5 5
	c.	TOTAL	NON ENERGY	DISCOUNTED	SAVINGS (+)	/ COST (-)	(3A2+3Ba4) \$
	D. (1)	25% M a. 1 b. 1 c. 1	AX NON ENER F 3D1 IS = F 3D1 IS F 3D1b IS =	OR 3C GO 3C CALC 1 GO TO	5 X .33) TO ITEM 4 SIR = (2F5	+3D1) : 1F =	<u> 118.59</u>
4.	FIR	ST YEA	R DOLLAR SA	VINGS 2F3+3	Λ+(3B1d : ΥΓ.	ARS ECONOMIC	LIFE) \$ 38.56
5.	TOT	AL HET	DISCOUNTED	SAVINGS (2	F5+3C)		\$ 359.38
6.	SIR	(IF	1 PROJECT	DOES NOT QU	ALIFY) (SIR)	=(5 : 1F)=	0.//

4.5 D.c	entralize Domesti	c Hot water Acaters	
Sea	Section 4.4 In	stantaneous Hot wa	te Heaters
	tall Shower Flow R	estrictors/Limited f	-low Shower heada
	karound:		
AN the	the existing shower same except for mout for their ow	heads for all unit where residents he on personal show	types are and changed heads.
	sumptions:		
	Flowrates from the same. Ore all unit types (re same type of head average flowrate, white originally calculated.	using data from provided
	ذ لم سلم الما الما الما الما الما الما ال	calculated. urate = 0.21 li	
	0	l/s) (1 gal) (60	•
Ь.	Min. Reg'd flowrat	. @ Shw = 3.0 g	
c.	Measurements were in the uncerta	e taken only to inty is	uarest 0.5 lity
	(0.51/105)(/3	178 Jul/e) (60 s/min) =	= 0.8 apm
050010 0 0 0	HONG & ASSOCIATES, INC.	DATE:	JOB No.:

CEDRIC D. O. CHONG & ASSOCIATES, INC.

CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 96819

Telephone (808) 847-6557

Telefax: (808) 847-6550

DATE:	JOB No).;
PROJECT NAME:		BY:
SUBJECT:	······································	Sht. 4-8

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Sht. 4-9 Of

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CEDRIC D. O. CHONG & ASSOCIATES, INC.
CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawali 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-/0

		11. 11.		
3.	Estimated I	ally HW V	(Sage	
	F 0 (11) (2			
	FOR SHOWER	٠. : - - : -		
	Ava,#		1 1 1 1	7 7 1/1/2
Unit		Avg.	Avg. Shur 1 Time (min.)	Daily HW Usage (Gal)
Type	Residents	Shur GPI	1 I Inc (min.)	Usage (Gal)
20-II	6	3	20	360
20-Ⅲ	4:	3	20	240
20-IV	6	3	20	360
20-V	3	3	20	180
20-VI	unit not	•		
32 - I	3	3	20	180
32 -II	Same aa			The particular statement as the Branch of the Committee o
32-111	3	3	20	180
32-17	5:	3	20	300
57-I	2	3	20	120
57-I	4	3	20	240
57-II	4	3	20	240
57-IV	Same as	Unit -	Type S7-II	
57-V	3 :	3	20	180
57-VI	Same às		pe 57-II	
57-71	Same as	Unit 0	Type 57-I	
57- <u>VIII</u>	Same as	Unit I	ype 57-II	
57-IX	Same aa	Unit -	Myre 57-II	
60-I	3	3	20	180
60-II	5		20	300
60-III	4	3	20	240
71-1	5	3 :	20	300
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DATE:	JOB No.:	
PROJECT NAME:	BY:	
SUBJECT:	Sht.	4-11

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			Uni	<u> </u>	# oF	LOA	DS.	TOTAL		R. I	PAILY HW
			Typ	<u>- </u>	RESID.	PER	RESID.	LOADS	WE LOAD		ISAGE
	<u>.</u>		-								
	; ;		20-1	<i>T</i>	ي		1.5	9	10		12.9
			20-3	Ц.	4			6			8.6
			20-	W:	ف			9			12.9
			20-		3			4,5			6.4
			32 -		333			4.5			6.4
			32-		3			4.5			6.4
			32-		5			7.5			10.7
			57-		2			3			4.3
			57-		4			6			8.6
			57-1		4			6			8.6
			:57-		<u>.</u> 3			45			6.4
	: :		60-	2371	3			4.5			6.4
			60-		5			7.5		······································	10.7
			60-	:	4			6			8.6
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CEDRIC D. O. CHONG & ASSOCIATES, INC.
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DATE:	JOB No.:	
PROJECT NAME:	BY:	
SUBJECT:	Sht.	4-12

			!		
	c. Dish	washer:			
		10001	CUCACI	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	a
		Day) x	(4 GAL/was	2) = 4	70
	E		dishwasher		
	(2	LOAD/Day)	4 GAL/WASH	() = 12 c	red
		J		(1
	d. Hand	dwashing			
		J	;		
		# oF	•	GAL. T	ER DAILY HW
	Type	, RESIDE	UTS PER PER		
			<u> </u>) (g	1) (ged)
					*** **********************************
	20-II		2	1.	12
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	32-区				10
	57-I	2			4
	57-II	4			8
	57-III	4			8
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Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-13

					1			
		<u>.</u>	Total	Daily Hu) Usage			
<u> </u>					<u> </u>			
			Unit	Shwrs.	Laund.	DIW	F∞D	TOTAL
			Type	(gpd)	(gpd)	(gpd)	PREP.	(gpd)
		: · ;	U		: 0	0	(gpd)	U
							0	
			20-II	36,0	12.9	. 12	12	396.9
: :	:		20-11	240	8.6	8	8:	264.6
			20-IV	360	12.9	12	12	396.9
		:	20-▼	180	6.4	6	6	198.4
			32 -I	180	6.4	G	G	198.4
			32-III	180	6.4	6	6	198.4
			32-IV	300	10.7	10	:/0	330.7
		:	57- I	120	4,3	4:	4	132.3
	:		57-II	240	8.6	8	8	264.6
			57-Ⅲ	240	8.6	8	8.	264.6
			57 - 又	180	6.4	6	6	198.4
			60-I	180	6.4	4	G	198.4
			60-II	300	10.7	/0	10	330.7
			60-III	240	8.6	8	8	264.6
			71-I	300	10.7	10	1/0	330.7
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DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-15

	Evaluate Energy Use for HW heating
a.	Unit Type 20-II
	Energy Use u/o heat pump
	[(397gel/day)x ([BTU/16-F)x(83316/gal)(120-70F)])(3413 BTUH/KW)
	= 48,4 kwH/Day
	Energy use al heat pump
	[(397 gal/day) x (ETU/16-F) x (8.33 lb/gel) (120-70F) (3413 BTUH/KW) (3.0 COP)
	= 16,1 kWH/3our
	Energy savings = 48.4 16.1 kwH/day = 32.3 kwH/day
	ANNUAL ENERGY SAVINGS = 32.3 KWH/day x 365 day/yr = 11,790 KWH/yr
	ANNUAL COST SAVINGS = 11,790 KWH/gr x (\$0.068 /KWH) = \$ 801.72
	Cost for Heat Pump Replacement = \$ 1700.00 (see a Hached)
	Payback = \$ 1700 = 2.1 yrs \$ 801.72/yr SIR = 4.23 (see off ached)
	SIR = 4,23 (seesHached)
	Replacing broken heat pumps in cost effective

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Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:	BY:	
SUBJECT:	Sht. 4-10	,

L' 2RATE: \$22.00 + 80% = "39.60

PROJECT OF THE PROJEC	9					FETIVATOR	S	אם שאטמוט	P. C. L.	30	Te
TEP BELL DELLEN TRAIT	3	7			7	10.10	2	10 01	ָרָרָ הָּרָרָ קריים בייניים	5	
TASK DESCRIPTION	MO. OF UNIT	UNIT	HW	TOTAL	UNIT	COST	UNIT	IT COST	UNIT	T COST	TOTAL
New Heat Pump		2	7	#	39.60	158.40			1120	1120.00	1278.40
									_		
									Sue	TATAL	1,278.40
							•		H/O	(154°)	191.76
						•				1.1(10%)	147.02
									7.4×	(44)	64.69
								ę.		(19.) d	16.82
									70T	4 C	1698.69
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						,			243	oL1\$	C
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DA FORM 5418-R, Apr 85 CONTD											

LOCA	T10#:		REGION NO	PROJE	CT NUMB	ER
PROJ	ECT TITLE _	Replace	e Broken Her Unit Type	at Pumpa	FISC	AL YEAR
DISC	RETE PORTIC	N NAME	Unit Type	20-II'		
ANAL	YSIS DATE _		ECONOMIC	LIFE <u>15</u>	_ YEARS	PREPARED BY
	INVESTMENT A. CONSTRUB. SIOH C. DESIGN D. ENERGY E. SALVAGI F. TOTAL	JCTION COST (ら・ラグ。) COST (10 CREDIT CAL VALUE OF	7-) .C (1A+1B+1C)X.9 EXISTING EQUIPMEN			0.00 3.50 0.00 17.15 1707.15
	ENERGY SAY!		COST (-) SAVINGS, UNIT COS	ST \$ DISCOUN	ITED SAV	INGS
		\$/MBTU(1)	SAVINGS ANNUMBTU/YR(2) SAVIN	NGS(3) FACT	OR(4)	SAVINGS(5)
	A. ELEC B. DIST C. RESID D. NG E. COAL	<u></u>	40.239 km; 1 s 80)1.72 <u>9.</u>		\$
	F. TOTAL		<u>\$8</u>	01.72		\$ 7,472
3.	A. ANNUAL (1) D	RECURRING ISCOUNT FA	+) / COST (-) (+/-) CTOR (TABLE 1) SAVING/COST (3A X	3A1)	\$ - \$	0
	B. NON RE	SAVINGS	YINGS (+) / COST \$ (+) YEAR OF (-)(1) OCCURRENC	DISCOL	JNT R (3)	DISCOUNTED SAV- INGS (+) COST(-)(4)
	a b	\$\$ \$\$				
			DISCOUNTED SAVIN	GS (+) / CO:	,	
	D. PROJEC (1) 25% MA a. 1F b. 1F c. 1F	T NON ENER X NON ENER 3D1 IS = 3D1 IS 3D1 IS =	GY QUALIFICATION GY CALC (2F5 X .3 OR 3C GO TO IT 3C CALC SIR 1 GO TO ITEM 4 1 PROJECT DOES N	TEST 3) EM 4 =' (2F5+3D1)	:	==== \$ 2.465.76
4.	FIRST YEAR	DOLLAR SA	VINGS 2F3+3A+(3B1	d : YEARS E	CONOMIC	Life) \$ 801.72
5.	TOTAL NET	DISCOUNTED	SAVINGS (2F5+3C)			\$ 7,472
6.	SIR (!F	1 PROJECT	DOES NOT QUALIFY)	(SIR)=(5:	1F)=	4.23

1 -1 (11 1 2	0 4	
(See pag	4-60C-	Repair = \$15	270.00
tayback	= 1270.00 \$ 801.10	= 0.34 2/yr	y far
		.0	
SIR =	1 1		
(see a Ho	adhed)		
Recairio	a the Lead	t punnsin m	are the second
Cost	deffective ?	t pumps is m Chan replace	ig
them.		/	7
	4		
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EDRIC D. O. CHONG & ASSOCIATES, INC. CONSULTING MECHANICAL & ELECTRICAL ENGINEERS 2130-E North King Street Honolulu, Hawali 96819 Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-18A

LUCA	ואטנז:	REGION NO.	PROJECT NUMBER	
PKUJ	ECT TITLE <u>Repair Broken</u> RETE PURTIUN NAME <u>Unit Te</u>	Heat Pumps	FISCAL YEAR	
VISC	RETE PURTIUN NAME Unit To	pe 20-#		
anal	YSIS DATEECONOMIC LI	ife 4 YEARS	PREPARED BY	
	INVESTMENT A. CUNSTRUCTION COST B. SIGH (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+1 E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	1C)X.9	\$ 270.00 \$ 14.85 \$ 27.00 \$ 280.67	\$ 280.67
2.	ENERGY SAVINGS (+) / CUST (-) ANALYSIS DATE ANNUAL SAVINGS. I	UNIT COST & DISCOUNTE	D SAVINGS	
	FUEL S/MBTU/YR(1) MBTU/	YR(2) SAYINGS(3) FA	CTOR(4) SAVINGS(5)
	A. ELEC \$ 19.92 40.23 B. DIST 5 C. KESID 5 U. NG 5 E. COAL 5 F. TUTAL		38 \$2,70	
3.	NUMENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABLE (2) DISCOUNTED SAVING/CUST	A)	s o	
	B. NONRECURRING SAVINGS(+) / (ITEM SAVINGS(+) YEAR CUST (-)(1) OCC (1)	COST(-) R OF DISCOUNT URRENCE(2) FACTOR(3)	DISCOUNTED SAV- INGS(+) COST(-)(\$ 5 5	(4) - -
	C. TUTAL NUMENERGY DISCOUNTED	SAVINGS(+) / COST(-)	(3A2+3Bd4)	\$
	U. PROJECT NONENERGY QUALIFICA (1) 25% MAX NUMENERGY CALC a. IF 3D1 15 = UR > 30 b. IF 3U1 15 < 30 CALC c. IF 3D1b 15 = > 1 G0 d. IF 3U1b 15 < 1 PRU	(2F5 X .33) C GO TO ITEM 4 C SIR = (2F5+3D1) D TO ITEM 4		
4	FIRST YEAR DULLAR SAVINGS 2F3+:	BA+(3Bld + YEARS ECON	OMIC LIFE)	5 801.72
5.	TITAL NET DISCUUNTED SAVINGS (2	2F5+3C)		\$ 2,709.81
ь.	ULSCOUNTED SAVINGS RATIO (IF C	1 PROJECT DOES NOT Q	UALIFY)(SIR)=(5 +	1F)- 9.65

4-18B

<i>b.</i>	Unil Type 20-III	
	Energy use without heat pump	
	(265 3al/day) (1 BTU/16-F) (8.33)	32.3 KWH 705) = 32.3 KWH
	Energy Use with heat pump	
	[(2C5 gal/day)(1 BTU/12-F)(8.3) (3413 BTUH/KW)	(3.0 COP) = 10.8 kw/ll (3.0 COP)
	Daily Energy Savings = 32.3	- 10.8 = 21.5 KWH/Dmy
	ANNUAL ENERGY SAVINGS = 21.5 KWH/day x (365 da	5/yr) = 7,848 KWH/yr
	ANNUAL COST SAVINGS = 7,848 KWH/yr x (\$0.0	68 /KWH) = \$ 533.6C
	Cost for heat pump replacement (see a Hached)	· · · · · · · · · · · · · · · · · · ·
	Payback = 16 1,700 \$ 533.66 lyr	_= 3.2 yrs
: :	SIR = 2.81	(see offacted)
	: Replacement of broken he be cost effective.	at pump units would
	IC & ASSOCIATES INC. DATE:	JOB No.:

EDRIC D. O. CHONG & ASSOCIATES, INC.

CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawaii 96819
Telephone (800) 847-8557
Telephone (808) 847-6550

DATE:	 JOB No.:	 	
PROJECT NAME:	 	BY:	
SUBJECT:		Sht.	4-19

WINT TOTAL UNIT COST UNIT COST PRINCE 1/20 1/	Replace Broken Heat	· Auros	1				ESTIMATOR	CHEC	CHECKED BY	SHEET	OF	HEETS
1 EA 4 4 39.60 IS8.40		MO. OF UNITS	UNIT	HWH	TOTAL	UNIT	COST	PRICE	COST	PRICE	1	TOTAL
EA # # 39.60 58.40 20 20.00 Sugnature		_										
Sugrature Off (157) (2-1) (167) (2-1) (167) (3-1) (167) (4-1) (167) (4-1) (167) (5-1) (167) (6-1) (167) (7-1) (167		_	2	#		39.60	1 1			1120	1120.00	1,278.40
Sug DARU Off (15%) (20) (16%) TAX (4%) Coup (19.) (20) \$100 Say \$170												
0/H(1572)										2112	7 ETC	1.278.40
										11/0	1 ~	191.76
74x (47) 60ub (17) 70T 4L 70T 4L										₹ 6	7.	147.02
- Coup (17)										7AX		64.69
767 4 C									•	<u> </u>	ها	16.82
70TAL Say #1700												
Say \$170										707		1698.69
100 PAY #170									٠			•
										243	oL1\$	0
	•											
									•			
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LUCATION:		REGION NO.	PROJECT NUMBER	
PRUJECT TITLE	Replace Broken ! NAME Unit T	Heat Pumps	FISCAL YEAR	
DISCRETE PORTION	NAME WATE	ype 20-111		
ANALYSIS DATE	ECONOMIC LIFE	15 YEARS	PREPARED BY	
E. SALVAGE	5.5%) DST (10%) REDIT CALC (1A+1B+1C)	X . 9	\$ 1700.00 \$ 93.50 \$ 170.00 \$ 1767.15	<u>\$ 17 67.1</u> 5
ANALYSIS DAT	GS (+) / COST (-) E ANNUAL SAVINGS, UNI			
FUEL \$/M	OST SAVINGS BTU/YR(1) MBTU/YR(ANNUAL \$ DIS 2) SAVINGS(3) FA	SCOUNT DISCOUNTED ACTOR (4) SAVINGS (5)
A. ELEC S B. DIST S C. RESID S D. NG S E. COAL S	19.92 26.79/wi	\$ \$ \$33.66	1.32 \$ 4, 973 3	3,71 - - - -
F. TUTAL	• • •	\$ 533.66	******	> 54,973.71
A. ANNUAL RI (1) DISC	VINGS(+) / COST(-) ECUKRING (+/-) DUNT FACTOR (TABLE A) UUNTED SAVING/CUST (3		<u>\$</u> 0	_
(1) (2) (3)	RING SAVINGS(+) / COS SAVINGS(+) YEAR O CUST (-)(1) OCCURR	F DISCOUNT		4) - -
C. TUTAL NU	NENERGY DISCOUNTED SA	VINGS(+) / COST(-) (3A2+3Bd4)	\$
(1) 25% a. b. c.	NONENERGY QUALIFICATI MAX NUNENERGY CALC (2 IF 3D1 IS = UR > 3C IF 3U1 IS < 3C CALC IF 3D1b IS = > 1 GU T IF 3D1b IS < 1 PRUJEC	F5 X .33) GO TO ITEM 4 SIR = (2F5+3D1) O ITEM 4	•	
4. FIRST YEAR D	ULLAR SAVINGS 2F3+3A+	(3B1d + YEARS ECO	NOMIC LIFE)	\$ 533.66
5. THTAL NET DI	SCUUNTED SAVINGS (2F5	+3C)		\$ 4 973.71
6. DISCOUNTED S	AVINGS RATIU (IF < 1	PROJECT DOES NOT	DUALIFY)(SIR)=(5 ::	•

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EDRIC D. O. CHONG & ASSOCIATES, INC.
DNSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawaii 96819
Telephone (800) 847-6557
Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-21A

LUCATION:	REGION NO.	PROJECT NUMBER	
PRUJECT TITLE Repair Broke	n Heat Pungs	FISCAL YEAR	
PRUJECT TITLE <u>Repair Broke</u> USCRETE PURTIUN NAME Unit T	ype 20-II		
ANALYSIS DATE ECONOMIC 1	.1FE 4 YEARS	PREPARED BY	
1. INVESTMENT A. CUNSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	+1C)x.9	\$ 270.00 \$ 14.85 \$ 27.00 \$ 2-30.67	<u>\$ 280.67</u>
 ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, 		ED SAVINGS	
COST SAVIN			
A. ELEC \$ 19.92 26.7 B. UIST \$ C. KESID \$ U. NU \$ C. COAL \$			<u>.</u> 77 - - -
F. TUTAL	<u>\$ 533.66</u>	****	> <u>\$ 1,803.</u> 77
3. NUMENERGY SAVINGS(+) / COST(- A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABL (2) DISCOUNTED SAVING/CUS	F Al	<u>s</u> 0	
$\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$	COST(-) AR OF DISCOUNT CURRENCE(2) FACTOR(3)	DISCOUNTED SAV- INGS(+) COST(-)(\$	4)
(4) TOTAL S	C. PAULUPEZ. N. Z. POST/		
C. TUTAL NUMENERGY DISCOUNTE D. PROJECT MOMENERGY QUALIFI (1) 25% MAX MUMENERGY CAL a. IF 301 IS = UR > D. IF 301 IS < 3C CA c. IF 301b IS = > 1 d. IF 301b IS < 1 PR	CATION TEST C (2F5 X .33) 3C CO TO ITEH 4 LC SIR = (2F5+3D1) CO TO ITEM 4	\$ 595.24) + 1F =	
4. FIRST YEAR DULLAR SAVINGS 2F3	+3A+(3B1d + YEARS ECO	NOHIC LIFE)	<u>\$ 533.66</u>
5. THAL HET DISCOUNTED SAVINGS	(2F5+3C)		\$ 1803.77
6. DISCOUNTED SAVINGS RATIO (1F	C 1 PROJECT DOES HOT	QUALIFY)(SIR)=(5 +	1F) = 6.42

<i>C</i> .	Unit Type 20-IV	
	Energy use without heat pump	
	[(397 gal/fay) (1 BTU/16-F) (8.3 (34/3 ETUH/KW)	13 16/20) (120-70F)]= 48.4 KWH
	and the second s	
	Energy Use with heat pumy	_
	[(397 gal/day)(BTU/12-F)(8.3)(3413 BTUH/KW)(3.0 COP)
	Daily Energy Savings = 48.4	
	ANNUAL ENERGY SAVINGS = 32.3 KWH/day x (365 d	
	ANNUAL COST SAVINGS = 11,790 kWH/yr x (\$0.0	068 /KWH) = \$ 801.72
	Cost for heat pump replaceme (see a Hached)	
	Payback = # 1700 \$ 301.72 lyr	_= 2.1 yrs
	SIR = 4.23	(see attached)
	: Replacement of broken he cost effective.	eat pump units would
	DATE:	IJOB NO ·

DRIC D. O. CHONG & ASSOCIATES, INC.

CONSULTING MECHANICAL & ELECTRICAL ENGINEERS

2130-E North King Street Honolulu, Hawaii 96819

Telephone (800) 847-6557

Telefax: (808) 847-6550

DATE:	ו.סא מסנ
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-22

LUC	ULTA	REGION NO. PROJECT NUMBER
PRU	JECT	ITLE Replace Broken Heat Pumps FISCAL YEAR
DIS	CRET	PURTIUN NAME Unit Type 20-II
ANA	LYSI	DATE ECONOMIC LIFE _\S YEARS PREPARED BY
1.	A. B. C. U. E.	### THENT ####################################
2.	ENE	SY SAVINGS (+) / COST (-) SIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS
	FUE	COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU/YR(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
	С.	ELEC \$ 19.92
	F.	S 801.72> \$ 7,472.03
3.	NUN A.	NERGY SAVINGS(+) / COST(-) ANNUAL RECUKRING (+/-) (1) DISCOUNT FACTUR (TABLE A) (2) DISCOUNTED SAVING/CUST (3A X 3A1) S O
	8.	NONRECURRING SAVINGS(+) / COST(-) (TEM SAVINGS(+) YEAR OF DISCOUNT DISCOUNTED SAV- CUST (-)(1) OCCURRENCE(2) FACTOR(3) INGS(+) COST(-)(4) (1)
		TUTAL HUNENERGY DISCOUNTED SAVINGS (+) / COST (+) (3A2+3Bd4)
	υ.	PROJECT NONENERGY QUALIFICATION TEST (1) 25% MAX NUMENERGY CALC (2F5 X .33) a. IF 3D1 IS = UR > 3C GO TO ITEM 4 b. IF 3U1 IS < 3C CALC SIR = (2F5+3D1) + 1F = c. IF 3D1b IS = > 1 GU TO ITEM 4 d. IF 3U1b IS < 1 PRUJECT ODES NOT QUALIFY
4.	FIR	YEAR DULLAR SAVINGS 2F3+3A+(3B1d + YEARS ECONOMIC LIFE) 5 801.72
5.	TIT	NET DISCOUNTED SAVINGS (2F5+3C) \$7,472.03
б.	ונו	UNTED SAVINGS RATIO (1F C 1 PROJECT DOES NOT QUALIFY)(SIR)=(5 =: 1F)= 4.23

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CEDRIC D. O. CHONG & ASSOCIATES, INC.
DNSULTING MECHANICAL & ELECTRICAL ENGINEERS
30-E North King Street Honolulu, Hawall 66810
Telephone (808) 847-6557
Telephone (808) 847-6550

DATE:	JON No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-24A

LUC	AT1UN:	REGION NO.	PROJECT NUMBER	
PRU	JECT TITLE Repair B	nit Type 20-IN	FISCAL YEAR	
UIS	CRETE PURTIUN NAME	nit Type 20-III		
ANA	LYSIS DATE ECO	NOMIC LIFE 4 YEARS	PREPAREO BY	
1.	INVESTMENT A. CUNSTRUCTION COST B. SION (5.57) C. DESIGN COST (1070) U. ENERGY CREDIT CALC E. SALVAGE VALUE F. TUTAL INVESTMENT (1	(1A+1B+1C)X.9	\$ 270.00 \$ 14.85 \$ 27.00 \$ 2-30.67	•
2.	ENERGY SAVINGS (+) / CU ANALYSIS DATE ANNUAL SA	ST (-) VINGS, UNIT COST & DISCOUN	TEO SAVINGS	
	FUEL S/MBTU/YR(1)	SAYINGS ANNUAL S C METU/YR(2) SAYINGS(3)	FACTOR (4) SAVINGS (5	5)
	A. ELEC \$ /9.92 B. DIST \$ C. KESID \$ D. NG \$ E. COAL \$	40.239/unit \$ 801.72	3.38 \$2,70	<u>9</u> .81
	F. TUTAL	\$ 801.72	*******	-> <u>\$ 2,709.8</u>
3.	NUMENERGY SAVINGS (+) / A. ANNUAL RECURRING (+ (1) DISCOUNT FACTUR (2) DISCOUNTED SAVI	·/-)	<u>s</u> <u>o</u>	_
		S(+) / COST(-) YEAR OF DISCOUNT) OCCURRENCE(2) FACTOR(3		(4) - - -
	C. TUTAL NUMENERGY DIS	COUNTED SAVINGS (+) / COST ((-) (3A2+3Bd4)	5
	. a. 1F 301 15 - b. 1F 301 15 C c. 1F 301b 15	UALIFICATION TEST GY CALC (2F5 X .33) UR > 3C CO TO ITEM 4 3C CALC SIR = (2F5+3C = > 1 CU TO ITEM 4 < 1 PRUJECT DOES NOT QUALI		<u>.</u>
4	FIRST YEAR DULLAR SAVIN	GS 2F3+3A+(3B1d + YEARS EC	ONOMIC LIFE)	\$ 801.72
5.	TITAL NET DISCOUNTED SA	VINGS (2F5+3C)		\$ 2,709.81
6.	DISCOUNTED SAVINGS RATI	U (IF < 1 PROJECT DOES HOT	QUALIFY)(SIR)=(5 +	1F) = 9.65

d	Unit Type 20-II
	Energy use without heat pump:
	[(198.4. gal/day) (BTU/16-F) (8.33 16/gol) (120-70F)]= 24.2 KWH (34/3 ETUH/KW)
	والأراد والمناب والمناب والمنافع والمستروسية والمناز والمناز والمناب والمناب والمستروس والمنافي والمنافية والمنافر
	Energy Use with heat pump
	[(198.4 gal/day)(1 BTU/11-F)(8.33.11/gal)(120-70F)] = 8.1 kw/day)(3413 BTUH/KW)(5.0 COP)
	Daily Energy Savings = 24.2 - 8.1 = 16.1 KWH/Dm
	ANNUAL ENERGY SAVINGS = 16.1 KWH/day x (365 day/yr) = 5,877 KWH/yr
	ANNUAL COST SAVINGS = 5,877 KWH/yr x (\$ 0.068/KWH) = \$ 399.63
	Cost for heat pump replacement = \$ 1700 (see a Hached)
	Payback = # 1,700 = 4.3
	SIR = 2.11 (see attached)
	:. Replacement of boken heat pump units would be cost effective.

DRIC D. O. CHONG & ASSOCIATES, INC.
NSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawali 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JON'N	o.:	
PROJECT NAME:	<u>k</u>	BY:	
SUBJECT:		Sht. 4-25	5

2	. 6					FCTIVATOR	in C	אם שאַטארט	0	2	THE TE
replace Droken Hat	45.5	4			\neg	ES I IMAI OR	2	יאבט פון	SHEE!	5	HEELS
	QUANTII	LITY			ABOR		EQL	EQUIPMENT	M	MATERIAL "),
TASK DESCRIPTION	NO. OF UNITS	UNIT	H. CALLT	TOTAL	PRICE	COST	PRICE	COST	UNIT PRICE	COST	TOTAL
New Heat Pump	~	2	4	#	39.60	158.40			1120	1120.00	1,278.40
									SuB	TOTAL	1,278.40
									110	(157.)	191.76
						٠				7. (10%)	147.02
									7Ax	(44)	64.69
		2122							. જુ	(19.)	16.82
									707	46	1698.69
											•
						,			2,42	oL1\$	0
•											
										•	
,											
DA FORM 5418-R, Apr 85 CONTD			·								

	REGION NO. PROJECT NUMBER
PKU.	CRETE PURTIUN NAME Wit Type 20-II
UIS	CRETE PURTIUN NAME Whit Type 20-12
ANA	LYSIS DATE ECONOMIC LIFE YEARS PREPARED BY
1.	INVESTMENT A. CUNSTRUCTION COST B. S10H (5.57.) C. DESIGN COST (107.) U. ENERGY CREDIT CALC (1A+1B+1C)X.9 E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E) S 1700.00 S 170.00 S 170.15 S 1707.15
2.	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT CDST & DISCOUNTED SAVINGS
	COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED FUEL \$/MBTU/YR(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
	A. ELEC \$19.92 20.058/un, 7 \$399.63 9.32 \$3,724.55 B. UIST \$ C. KESID \$ U. NG \$ E. COAL \$ The state of the
	F. TUTAL 5399.63
3.	NUMENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) (2) DISCOUNTED SAVING/CUST (3A X 3A1) S O
	B. NONRECURRING SAVINGS(+) / COST(-) ITEM SAVINGS(+) YEAR OF DISCOUNT DISCOUNTED SAV- CUST (-)(1) OCCURRENCE(2) FACTOR(3) INGS(+) COST(-)(4) (1)
	C. TUTAL HUNENERGY DISCOUNTED SAVINGS(+) / COST(-) (3A2+3Bd4)
	D. PROJECT NONENERGY QUALIFICATION TEST (1) 25% MAX NUNENERGY CALC (2F5 X .33) a. IF 3D1 IS = UR > 3C GO TO ITEM 4 b. IF 3U1 IS < 3C CALC SIR = (2F5+3D1) + IF = c. IF 3D1b IS = > 1 GU TO ITEM 4 d. IF 3U1b IS < 1 PRUJECT DOES NOT QUALIFY
4.	FIRST YEAR DULLAR SAVINGS 2F3+3A+(3B1d + YEARS ECONOMIC LIFE) \$ 399.63
5.	TITAL NET DISCOUNTED SAVINGS (2F5+3C) \$ 3,724.55
6.	UISCUUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY)(SIR)=(5 .:1F)= 2.//

Cost for	Heat Puma Repa	c = \$1270.00
(See pa	Heat Pump Repa	60€)
	= ¹ / ₂ - 70,00 = II 399.C3	
SIR = (see at	4.81 lached)	
Repair	ing the heat pur Let tive than re	ps is more
COST 21	Tec. 11 on Re	pipasa pam.
		; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
	(DATE:	

CEDRIC D. O. CHONG & ASSOCIATES, INC.
ONSULTING MECHANICAL & ELECTRICAL ENGINEERS
130-E North King Street Honolulu, Hawall 06818
Telephone (600) 647-6557 Telephone (600) 647-6550

DATE:	JON No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-27A

۵۵	AT LUH	:		REGION	мо	PROJECT	NUMBER	
PKU	JECT	TITLE Repa	ir Broken	Heat P	umps_	FISCAL	YEAR	
UIS	CRETE	TITLE Repa	Unit Tu	pe 20	-亚			
ANA	LYS IS	DATE	ECONOMIC LI	FE <u>+</u>	YEARS	PREPARED	BY	
1.	A. B. C. U. £.	STMENT CUNSTRUCTION (SION (5.5%) DESIGN COST (ENERGY CREDIT SALVAGE VALUE TUTAL INVESTME	1070) CALC (1A+1B+)	.c)x.9		3_	270.00 14.85 27.00 -80.67	<u>\$ 280.67</u>
2.	ENER	RGY SAVINGS (+ LYSIS DATE ANNI) / CUST (-) HAL SAVINGS, I	INIT COST	& DISCOUNTE	ED SAVINGS	;	
	FUEL	COST \$/MBTU/YI	(1) HBTU/	18(2) SA1	YINGS (3) FA	ACTOR (4)	SAVINGS (5)
	Ċ.	ELEC \$ 19.92 DIST THESID THESID THESID THESID THESID THESID THESID THESID THESE THES	20.058	lunit \$3	99.63	3.38	\$ 1,350.	75 - - -
	F.	TUTAL			399.63	•		> 51,350.75
3.	HÜKE A.	ENERGY SAVINGS ANNUAL RECURR (1) DISCOUNT 1 (2) DISCOUNTE	ING (+/-) FACTUR (TABLE	A)	1)	<u>s</u>	0	-
	B.	NONRECURRING 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	YES(+) YEAI (-)(1) OCCI	COST(-) R OF URRENCE(2	DISCOUNT FACTOR(J)	D1SCOUNT 1 NGS (+)	HTED SAV-) COST(-)(4)
	c.	TUTAL NUMENER	Y DISCOUNTED	SAVINGS (+) / COST(-) (3A2+3Ba	14)	\$
	D.	b. IF 301c. IF 301	ERGY QUALIFICA JHEHERGY CALC 1S = UR > X 1S < 3C CALC 1S = > 1 CC 1D 1S < 1 PRUC	(2F5 X .: CO TO : SIR TO ITEM	33) ITEM 4 = (2F5+301) 4) + 1F =	HS.75	
ŧ	FIRS	T YEAR DULLAR	SAVINGS 2F3+	DA+(381d)	YEARS ECO	NOHIC LIFE	:)	<u>\$ 399.63</u>
5.	TOTA	L NET DISCOUNT	TED SAVINGS (2F5+3C)				\$ 1,350.75
i.	ulsc	UUNTED SAVINGS	RATIO (IF C	1 PROJECT	DOES NOT	DUALIFY\(S	IR1=15 +	1F1= 4.8/

e	Unil Type 32-I (= 32-II)
	Energy use without heat pump:
	[(198.4.3al/day)(1BTU/16-F)(8.33 lb/gal)(120-70F)]= 24.2 KWH (3413 ETUH/KW)
	Energy Use with heat pump
	[(198.4 gal/day)(BTU/N-F)(8.33.11/gal)(120-70F)] = 8.1 Hay) (3413 BTUH/KW)(5.0 COP)
	Daily Energy Savings = 24.2 - 8.1 = 16.1 KWH/Dmy
	ANNUAL ENERGY SAVINGS = 16.1 KWH/day x (365 day/yr) = 5,877 KWH/yr
	ANNUAL COST SAVINGS = 5,877 KWH/yr. × (\$0.068/KWH) = \$399.63
	Cost for heat pump replacement = \$1,700 (see a Hached)
	Payback = $\frac{11}{1100}$ = $\frac{4.25}{399.63}$ yrs
	SIR = 2.11 (see attached)
	Replacement of broken heat pump units would be cost effective.

DRIC D. O. CHONG & ASSOCIATES, INC.

NSULTING MECHANICAL & ELECTRICAL ENGINEERS

2130-E North King Street Honolulu, Hawali 96819

Telephone (808) 847-6557

Tolefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-28

HEFT		.A.	34.		278.40	191.76	147.02	64.69	16.82		8.69						-				
		TOTAL	1,278.40		1,27	161			9/		16,98.69										
i.		MATERIAL T COST	1120.00		SURTOTAL	(124°)	%OI) 1.4	(44)		1	AL		oL1\$								
SHEFT		UNIT	1120		Sug	11/0	10 m		. Bow		707	1	24.2								
CHECKED BY		IT COST							ď									,			
CHE		PRICE																			
FSTIMATOR		COST	158.40				•													·	
:	- 1	UNIT	39.60																		
		TOTAL	 #																		
		H.H.	#																		
	71.	UNIT	Z			•															
. 8	VIIIV	NO. OF UNITS	_																		
F. Roberton Roke Hond	Table Waller	TASK DESCRIPTION	New Heat Puno																		

LUC	ULTA	N:			REGION !	YD	_ PROJECT	NUMBER	
PKU	JECT	TITLE	Replace	Broken	Heat F	umos	FISCA	L YEAR	
וע	CRET	E PURTIUN	NAME	Unit	Type 3	2·± 43	2 - II	L YEAR	
ANA	LYS1	S DATE	EC	DNOMIC LIF	E 15	YEARS	PREPARED	BY	
1.	A. B. C. U. E.	SIOH (S DESIGN CO SALVAGE	TION COST S.S T.) OST (10 T. REDIT CALC VALUE VESTMENT ((1A+1B+1C)x.9		- <u>7</u>	1700.00 93.50 170.00 1767.15	<u>\$ 17 67.1</u> 5
2.			GS (+) / C E ANNUAL S		IT COST	& DISCOUNT	ED SAVING	S	
		L 3/M	BTU/YR(1)	MBTU/YR	(2) SAV	INGS(3) F	ACTOR (4)	DISCOUNTED SAVINGS (5)
	A. B. C. U. E.	ELEC SUIST SELECTION SELEC	19.92	20.058/	nit \$ 3°	99.63	9.32	\$ 3,724	<u>+</u> , 5\$ - -
	F.	TUTAL			<u> </u>	99.63			> 5 3,724.55
3.	NUN A.	ANNUAL R (1) DISC	VINGS(+) / ECURRING (OUNT FACTO UUNTED SAV	+/-) R (TABLE A	())	<u>s</u> . <u>s</u>		-
	8.	ITEM	RING SAVIN SAVINGS(+ CUST (-)() YEAR 1) OCCUR	OST(-) OF RRENCE(2)	OISCOUNT FACTOR (3)	3 015COL	INTEO SAY-	4)
		(4) TDTA	<u> </u>	_			5	 	
	С.	TUTAL NO	NENERGY DI	SCOUNTED S	AVINGS (+) / COST(-) (3A2+3B	d4)	<u>\$</u>
	υ.	(1) 25% 1 a. b. c.	NONENERGY MAX NUNENE IF 301 IS IF 301 IS IF 301b IS IF 301b IS	RGY CALC (• UR > 3C < 3C CALC • > 1 GU	GO TO I SIR TO ITEM	3) TEM 4 = (2F5+3D1 4) + 1F =	229.10	
١.	FIR	ST YEAR D	DLLAR SAVI	NGS 2F3+3A	+(3Bld +	YEARS ECO	NOMIC LIF	E)	\$ 399.63
٠.	T+)T	AL NET DIS	SCUUNTED SA	AVINGS (2F	5+30)				<u>\$3,724.55</u>
i.	UISO	CUUNTED SA	AVINGS RAT	10 (1F < 1	PROJECT	DOES NOT	QUALIFY)(SIR)=(5 ::	1F) • <u>2.11</u>

Cost for	Hest Puna Pena	= 41070 00
(See pag	Heat Pump Repair	GOE)
Parabach	= 4270 00 -	0.68
13000	= \$\pi_{270.00} = \$\pi_{399.63}\$	9,300
SIR =		
Repair	her tive than is	ps à more
COCT	nor Tipe. In on H	2.p. 0.
*		
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CEDRIC D. O. CHONG & ASSOCIATES, INC.
DNSULTING MECHANICAL & ELECTRICAL ENGINEERS
130-E North King Street Honolulu, Hawall 00810
Telephone (800) 847-6557
Telephone (800) 847-6550

DATE:	JON No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-30A

LUC.	ATIUN: PROJECT NUMBER	
טאפ	JECT TITLE Repair Broken Heat Pumps FISCAL YEAR	
ווא	CRETE PURTIUN NAME Unit Type 32-I d 32-II	
AKA	LYSIS DATE ECONOMIC LIFE YEARS PREPARED BY	
1.	INVESTMENT A. CUNSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+1C)X.9 E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	<u>\$ 280.67</u>
2.	ENERGY SAVINGS (+) / CUST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS	
	FUEL SAVINGS ANNUAL S DISCOUNT DISCOUNTER FUEL SAVINGS (3) FACTOR (4) SAVINGS (3)) 5)
	A. ELEC \$ 19.92 20.058/unit \$ 399.63 3.38 \$ 1.350 B. UIST \$ C. HESID \$ U. NU \$ E. COAL \$ TOTAL \$ 399.63	.75 - - -> \$1,350.75
3.	NUNENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABLE A) (2) DISCOUNTED SAVING/CUST (3A X 3A1) \$ 0	
	B. HONRECURRING SAVINGS(+) / COST(-) ITEM SAVINGS(+) YEAR OF DISCOUNT DISCOUNTED SAV- CUST (-)(1) OCCURRENCE(2) FACTOR(3) INGS(+) COST(-) (1) \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	
	C. TUTAL NUMENERLY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)	\$
	U. PROJECT NONENERGY QUALIFICATION TEST (1) 25% MAX NUNENERGY CALC (2F5 x .33) a. IF 3D1 1S = UR > 3C CO TO ITEM 4 b. IF 3U1 1S < 3C CALC SIR = (2F5+3D1) + 1F = c. 1F 3U1b 1S = > 1 GU TO ITEM 4 d. · IF 3U1b 1S < 1 PRUJECT DOES NOT QUALIFY	-
4	FIRST YEAR DULLAR SAVINGS 2F3+3A+(3B1d + YEARS ECONOMIC LIFE)	\$ 399.63
5.	TITAL NET DISCUUNTED SAVINGS (2F5+3C)	<u>\$ 1,350.75</u>
5.	UISCUUNTED SAVINGS RATIO (IF < 1 PROJECT DOES HOT QUALIFY)(SIR)=(5 +	1F)= 4.81

\mathcal{F}	Unil Type 32-II
	Energy use without heat pump:
	[(198.4.3al/tay) (1 BTU/16-F) (8.33 16/asl) (120-70F)]= 24.2 KWH Dy
	Energy Use with heat pump:
	[(198.4 gal/day)(1 BTU/1-F)(8.33.11/gal)(120-70F)] = 8.1 kwH J(3413 BTUH/KW)(5.0 COP)
	Daily Energy Savings = 24.2-8.1 = 16,1 KWH/Dm
	ANNUAL ENERGY SAVINGS = 16.1 KWH/day x (365 dm/yr) = 5,877 KWH/yr
	ANNUAL COST SAVINGS = 5,877 KWH/yr × (\$ 0.068 /KWH) = \$ 399.63
	Cost for heat pump replacement = \$ 1700 (see attached)
	Payback = # 1700 = 4.25 yrs
	SIR = 2.11 (see attached)
	:. Replacement of broken heat pump units would be cost effective.

DRIC D. O. CHONG & ASSOCIATES, INC.
CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 96819
Telephone (800) 847-6557
Telefax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-31

	. 6					FETTIVATOR	J. T.	CHECKEN AY	CHEET	15	REFTS
Table Dollar Ha	127.	4				CSTSWATOR		200	31.15	5	
	QUANTITY	TITY			LABOR		EQU	EQUIPMENT	Ä	MATERIAL	
TASK DESCRIPTION	NO. OF UNITS	UNIT	ENIT.	TOTAL HRS	UNIT	COST	PRICE	COST	UNIT PRICE	cosT	TOTAL
New Heat Puno	-	Z	4	#	39.60	158.40			1120	1120.00	1,278,40
		·							-		
									Sug	TOTAL	1,278.40
									11/0		191.76
						•			₹ 6	اعا	147.02
									7AX		64.69
								•	· Bowd		16.82
									70T	46	1698.69
								•			•
						,			SAS	oL1\$	2
										•	
DA FORM 5418-R, Apr 85 CONTO											

LUCAT	Tlun:	REGION NO.	PROJECT NUMBER	
PKUJI	ECT TITLE Replace Broken RETE PUNTIUN NAME Unit	Heat Pumps	FISCAL YEAR	
DISCR	RETE PURTIUN NAME	1310		
ANALY	YSIS DATE ECONOMIC LI	FE 15 YEARS	REPARED BY	
; () !	INVESTMENT A. CUNSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+1 E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	C)X.9	\$ 1700.00 \$ 93.50 \$ 1767.15 \$ 176	<u>7.1</u> 5
2. 1	ENERGY SAVINGS (+) / CUST (-) ANALYSIS DATE ANNUAL SAVINGS, U	NIT COST & DISCOUNTER) SAVINGS	
1	COST SAVINGS FUEL \$/MBTU/YR(1) MBTU/Y	ANNUAL \$ DIS R(2) SAVINGS(3) FA	COUNT DISCOUNTED CTOR(4) SAVINGS(5)	
i (A. ELEC \$19.92 20.058 B. UIST \$ C. KESID \$ U. NG \$ E. COAL \$	wit \$ 399.C3	3.32 \$ 3,724.55	
1	F. TUTAL	<u>\$399.63</u>	••••• <u>\$3,7</u>	24.55
3.	NUNENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABLE (2) DISCOUNTED SAVING/CUST	A)	<u>\$</u> 0	
1	B. NDNRECURRING SAVINGS(+) / C 1TEM SAVINGS(+) YEAR CUST (-)(1) OCCU (1) S (2) S (3) S (4) TOTAL S	OST(-) OF DISCOUNT PRENCE(2) FACTOR(3)	DISCOUNTED SAV- INGS(+) COST(-)(4) \$ 3 3	
(C. TUTAL NUMENERGY DISCOUNTED	SAVINGS(+) / COST(-)	(3A2+3Bd4) <u>\$</u>	
	D. PROJECT NONENERGY QUALIFICA (1) 25% MAX NUNENERGY CALC a. IF 3D1 IS = UR > 3C b. IF 3D1 IS < 3C CALC c. IF 3D1b IS = > 1 GU d. IF 3D1b IS < 1 PRUJ	(2F5 X .33) GO TO ITEM 4 SIR = (2F5+3D1) TO ITEM 4	\$ 1,229.10 + 1F =	
4. F	FIRST YEAR DULLAR SAVINGS 2F3+3	A+(3Bld + YEARS ECON	OMIC LIFE) \$ 399	.63
5. 1	TITAL NET DISCOUNTED SAVINGS (2	F5+3C)	<u>\$3,7</u>	24.55
6 1	DISCOUNTED SAVINGS DATIO (15 2	1 PROJECT DOES NOT O	INITEVI/STON=/5 -: 151- () 11

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SEDRIC D. O. CHONG & ASSOCIATES, INC.

NSULTING MECHANICAL & ELECTRICAL ENGINEERS

130-E North King Street Honolulu, Hawall 06810

Telephone (800) 847-6557

Telephone (800) 847-6550

DATE:	10N No.:	
PROJECT NAME:	<u> </u>	BY:
SUBJECT:		Sht.4-33A

	ATIUN:	REGION NO.	PROJECT NUMBER	
PKU.	JECT TITLE Repair Broken	Heat Pumps.	FISCAL YEAR	
UIS	JECT TITLE <u>Repair Broken</u> CRETE PURTIUN NUME <u>Unit</u> T	ype 32-III		
	LYSIS DATEECONOMIC L			
1.	INVESTMENT a. CUNSTRUCTION COST b. SION (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+ E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	1C)x.9	\$ 270.00 \$ 14.85 \$ 2-7.00 \$ 2-80.67	<u>\$ 280.67</u>
2.	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS,	UNIT COST & DISCOUNTE		
	FUEL S/MBTU/YR(1) MBTU/	S AHNUAL S DIS YR(2) SAYINGS(3) FA	COUNT DISCOUNTED CTOR(4) SAYINGS(5)
	A. ELEC \$ 19.92 20.050 B. UIST \$ C. HESID \$ U. NU \$ E. COAL 3			- - -
		\$ 399.63	•••••	3 1,350.75
3.	NUMENERGY SAYINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABLE (2) DISCOUNTED SAYING/CUST	: A)	<u>s</u> 0	-
	B. HOHRECURRING SAVINGS (+) / ITEM SAVINGS (+) YEA CUST (-)(1) OCC (1)	R OF DISCOUNT	DISCOUNTED SAV- INGS(+) COST(-)(\$ 3	4)
	C. TUTAL NUMENERGY DISCOUNTED	SAVINGS(+) / COST(-)	(3A2+3Bd4)	\$
	D. PROJECT NONEMERGY QUALIFIC (1) 25% MAX NUMEMERGY CALC a. IF 3D1 IS = UR > 3 b. IF 3D1 IS < 3C CAL c. IF 3D1b IS = > 1 C d. IF 3D1b IS < 1 PRO	: (2F5 X .33) C CO TO 1TEH 4 C SIR + (2F5+3D1) U TO ITEH 4	\$ 445.75 • 1F =	•
4	FIRST YEAR DULLAR SAVINGS 2F3+	JA+(3B1d + YEARS ECON	OHIC LIFE)	5 399.63
۶.	TITAL NET DISCOUNTED SAVINGS (2F5+3C)		5 1,358.75
i.	DISCOUNTED SAVINGS RATIO (IF C	1 PROJECT DOES NOT Q	UALIFY)(SIR)=(5 +	1F)= <u>4.81</u>

g Unit Type 32-IV
Energy use without heat pump:
[(330.7 gal/day) (BTU/16-F) (8.33 lb/g.d) (120-70F)]= 40.4 KWH (34/3 BTUH/KW)
Energy Use with heat pump:
Daily Energy Savings = 40.4-13.5 = 26.9 KWH/Dm
ANNUAL ENERGY SAVINGS = 26.9 KWH/day × (365 dm/lyr) = 9,819 KWH/yr
ANNUAL COST SAVINGS = 9,819 KWH/yr × (\$0.068/KWH) = \$667.69
Cost for heat pump replacement = \$ 1700 (see a Hached)
Payback = #1700 = 2.55 yrs
SIR = 3.52 (see attached)
: Replacement of broken heat pump units would be cost effective.

DRIC D. O. CHONG & ASSOCIATES, INC.
ONSULTING MECHANICAL & ELECTRICAL ENGINEERS
-2130-E North King Street Honolulu, Hawall 96819
Telephone (808) 847-6557
Telefax: (808) 847-8550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-34

4 4 39.60 58.40 UNIT COST PRICE COST PRICE COST TOTAL L278.40 4 4 39.60 58.40 120 126.00 1278.40 A <th< th=""><th>Kat</th></th<>	Kat
4 39.60 58.40 120 120 120.00	HO. OF UNIT MH
4 39.60 158.40 1120 1120.00 1120	
SUB 727AL OUT (15%) Pa 121 (10%) 4	
Sue Total Off (15%) Part (15%) Part (15%) Tax (47%) Bowd (17%) Say \$1700	
0/H (157a) (4.7c) (4.7c) (4.7c) (4.7c) (4.7c) (1.7c)	
TAX (47.) TAX (47.) Poud (19.) Say \$1700	
7Ax (47) - Cowb (19.) - Cowb (19.) - Cor 4L - Say \$1700	
- Bowb (19.) Total Say \$1700	
70TAL Say \$1700	
70TAL Say \$170C	
SAY \$1700	
SAY \$170.	

LUCATION:	REGION NO.		
PRUJECT TITLE Replace Broken Unit Unit	Heat Pumps	FISCAL YEAR	
DISCRETE PURTIUM NAME Writ	Type 32-IV		,
ANALYSIS DATE ECONOMIC LI	FE 15 YEARS P	REPARED BY	
1. INVESTMENT A. CUNSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+1 E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	C)X.9	\$ 1700.00 \$ 93.50 \$ 170.00 \$ 1767.15	<u>\$ 1767.1</u> 5
2. ENERGY SAVINGS (+) / CUST (-) ANALYSIS DATE ANNUAL SAVINGS, U	NIT COST & DISCOUNTED	SAVINGS	
CDST SAVINGS FUEL \$/MBTU/YR(1) MBTU/Y	ANNUAL \$ DISC R(2) SAVINGS(3) FAC	OUNT DISCOUNTED TOR (4) SAVINGS (5)
A. ELEC \$ 19.92 33.5/2/U B. DIST \$ C. KESID \$ D. NG \$ E. COAL \$	nit \$667.69 -	7.32 \$ 6,225	<u>2</u> .87 - - -
F. TUTAL	\$ 667.69		> 56,222.87
3. NUMENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABLE (2) DISCOUNTED SAVING/CUST	A)	<u>s</u> 0	-
B. NONRECURRING SAVINGS(+) / C ITEM SAVINGS(+) YEAR CUST (-)(1) OCCU (1) S (2) S (3) S (4) TOTAL S	OST(-) OF DISCOUNT RRENCE(2) FACTOR(3)	DISCOUNTED SAV- INGS(+) COST(-)(\$ 5 5 5	4)
C. TUTAL HUNENERGY DISCOUNTED	SAVINGS(+) / COST(-)	(3A2+3Bd4)	\$
D. PROJECT NONENERGY QUALIFICA (1) 25% MAX NUNENERGY CALC a. IF 3D1 IS = UR > 3C b. IF 3U1 IS < 3C CALC c. IF 3D1b IS = > 1 GU d. IF 3U1b IS < 1 PRUJ	(2F5 X .33) GO TO 1TEM 4 SIR = (2F5+3D1) TO 1TEM 4	\$ 2,053.55 + 1F =	
4. FIRST YEAR DULLAR SAVINGS 2F3+3	A+(3Bld + YEARS ECONO	HIC LIFE)	\$667.69
5. TITAL NET DISCOUNTED SAVINGS (2			56,222.87
6. DISCOUNTED SAVINGS RATIO (IF <	1 PROJECT DOES NOT QU	ALIFY)(SIR)=(5 ·:	1F)= <u>3.52</u>

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DNSULTING MECHANICAL & ELECTRICAL ENGINEERS 130-E NORTH King Street Honolulu, Hawall 06810 Telephone (800) 847-6557 Tuletax: (808) 847-6550

DATE:	JON NO.	:
PROJECT NAME:		BY:
SUBJECT:		Snt. 4-36A

	ATIUN:			PROJECT NUMBER	
PRU	JECT TITLE Repo	air Broken !	Heat Pumps.	FISCAL YEAR	
ומוט	CRETE PURTION MANE	Unit Typ	22-1立		
ANA	LYSIS DATE	ECONOMIC LIFE	4 YEARS	PREPARED BY	**************************************
1.	INVESTMENT A. CUNSTRUCTION B. SION (5.5%) C. DESIGN COST U. ENERGY CREDIT E. SALVAGE VALUE F. TUTAL INVEST	(10%) [CALC (1A+1B+1C))X.9	\$ 270.00 \$ 14.85 \$ 27.00 \$ 2-30.67	
2.	ENERGY SAVINGS (ANALYSIS DATE AN	+) / CUST (-) NUAL SAVINGS, UN	IT COST & DISCOUN	TED SAVINGS	
				ISCOUNT DISCOUNTE FACTOR (4) SAYINGS	
	E. CUAL 3		7	3.38 \$ 2,25	
	F. TUTAL		5667.69	***	> <u>\$ 2,256.</u> 70
3.	NUMEHERGY SAVING A. ANNUAL RECUR (1) DISCOUNT (2) DISCUUNT	S(+) / COST(-) RING (+/-) FACTUR (TABLE A EU SAVING/CUST () DA X 3A1) ———	<u>s</u>	
	CUS	INGS (+) YEAR (T (-)(1) OCCUR!	OF DISCOUNT	DISCOUNTED SAY) (4) = =
	C. TUTAL HUNENE	RGY DISCOUNTED SA	AVINGS(+) / COST(-) (3A2+3Bd4)	5
	a. 1F 3 b. 1F 3 c. 1F 3	NUMENERGY CALC () D1 1S = UR > DC U1 1S < DC CALC D1b 1S = > 1 GU	265 X .33) CO TO 17EH 4 SIR = (265+30	3 744.74 1) + 1F = FY	
4	FIRST YEAR DULLA	R SAVINGS 2F3+3A	+(3Bld + YEARS EC	ONOMIC LIFE)	<u>\$ 667.69</u> \$2,256.79
5.	TITAL NET DISCUU	NTED SAVINGS (2F	5+30)		\$2,256.79
ĸ	DISCOUNTED SAVING	C DATTH /IC / 1	PRAJECT BASE MAT	MINITERNISTENALS	151- 0 24

h. Unit Type 57-I. Energy Use without heat pump: (132.3 3al/day) (1 βτυ/16-F) (8.33 16/dal) (120-70F)]- 16.1 kwt Dr. (3413 βτυΗ/κω) Energy Use with heat pump (132.3 3al/day) (1 βτυ/16-F) (3.33 16/dal) (120-70F)] = 5.4 kwl Jaw J (3413 βτυΗ/κω) (5.0 cop) Daily Energy Savings = 16.1-5.4 = 10.7 kwH/Dw ANNUAL ENERGY SAVINGS = 10.7 kwH/lox x (36.5 dm) = 3906 kwH/lox		
Energy Use without heat pump: [(132.3 gal/tay) (1 BTU/16-F) (8.33 lb/gal) (120-70F)]= 16.1 kml (3413 BTUH/KW) Energy Use with heat pump: [(132.3 gal/day) (1 BTU/16-F) (8.33 lb/gal) (120-70F)] = 5.4 kml (3413 BTUH/KW) (3.5 COP) Daily Energy Savings = 16.1-5.4 = 10.7 KWH/DW	h.	Unit Type 57-I
[(132.3 gal/tay) (1 βτυ/16-F) (8.33 lb/gal) (120-70F)]= 16.1 km/Dm Energy Use with heat pump [(132.3 gal/day) (1 βτυ/16-F) (8.33 lb/gal) (120-70F)] = 5.4 km/day (3413 βτυμ/κω) (3.0 cop) Daily Energy Savings = 16.1-5.4 = 10.7 κωμ/Dm		ന്നുടെ അത്രുത്തിലെ അന്ത്ര അവര്യ അവര്യ അവര്യ അവര്യ വിശാഗ്യ വിശാഗ്യ വിശാഗ്യ വിശാഗ്യ അവര്യ അവര്യ അവര്യ അവര്യ അവര്യ
Energy Use with heat pump [(132.3 gal/day)(βτυ/μ.ε)(8.33 ll/gal)(120-70F)] = 5.4 kwl/day (3413 βτυθ/κω)(3.0 cop) Daily Energy Savings = 16.1-5.4 = 10.7 κωθ/Day		
		$(334/3 ETUH/K\omega)$
Daily Energy Savings = 16.1-5.4 = 10.7 KWH/Dw		Energy Use with heat pump
Daily Energy Savings = 16.1-5.4 = 10.7 KWH/Dw		[(132.3 gal/day) (1 BTU/IL-F) (8.33.11/gol) (120-70F)] = 5.4 kwh (3413 BTUH/KW) (3.0 COP)
7,0,7,		ANNUAL ENERGY SAVINGS = 10.7 KWH/day x (365 day/yr) = 3,906 kWH/yr
ANNUAL COST SAVINGS = 3,906 kwH/yr × (\$ 0.068/kwH) = \$ 265.61		ANNUAL COST SAVINGS = 3,906 KWH/yr × (\$ 0.068/KWH) = \$ 265.61
Cost for heat pump replacement = \$1,700 (see a Hached)		V (
Payback = # 1,700 = 6.4 yrs		Payback = # 1,700 = 6.4 yrs
SIR = 1.40 (see attached)		
Replacement of broken heat pump units would be cost effective.		i. Replacement of broken heat pump units would be cost effective.

DRIC D. O. CHONG & ASSOCIATES, INC.
ONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawaii 96819
Telephone (808) 847-6557
Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-37

	QUANTITY	٦			LABOR		EQL	EQUIPMENT	N.A	MATERIAL	
TASK DESCRIPTION	NO OF UNITS	WEAS	KH	TOTAL	UNIT PRICE	COST	PRICE	COST	UNIT	созт	TOTAL
21 Pump		\$	#	#	39.60	158.40			1120	1120.00	07.8721
									SUR	TOTAL	1,278.40
•									H/0	(15%)	191.76
						•			P	7.4 (10%)	147.02
										(4%)	64.69
								ď		\sim	16.82
										1	
									707	AL	16,98.69
									24.2	\$170	0
•											
								-			
											-

LUC	ATIUI	N:		REGIUN NO	•	PROJECT I	NUMBER	
PKU	JECT	TITLE <u>Replace</u> E PURTIUN NAME	Broken	Heat Pu	mpa	_ FISCAL	YEAR	
וצוע	CRETE	E PURTIUN NAME	Unit 1	lype 51	-1			
ANA	LYSIS	S DATEE	CONOMIC LIFE	_15_Y	EARS P	REPARED I	3Y	
	A. B. C. U. E.	ESTMENT CUNSTRUCTION COST SION (5.5%) DESIGN COST (10% ENERGY CREDIT CAL SALYAGE VALUE TUTAL INVESTMENT	7。) C (1A+1B+1C)	x. 9		3_1	700.00 93.50 70.00 767.15	s 1767.15
2.	ENER	RGY SÄVINGS (+) / LYSIS DATE ANNUAL	CUST (-) SAVINGS, UNI	T COST & 1	DISCOUNTED	SAVINGS		
		COST \$/MBTU/YR(1)						
	B. C. U. E.	ELEC \$ 19.92 DIST \$	13.331 un	± \$265	·GI	7.32	\$ 2,475	49
		TUTAL		\$269	5.61	•	>	\$2,475.49
3.	NUNE A.	ENERGY SAVINGS(+) ANNUAL RECUKRING (1) DISCOUNT FACT (2) DISCOUNTED SA	(+/-) UR (TABLE A)	A X 3Al)	-	<u>s</u>	0	
	B.	$ \begin{array}{c} (1) \\ (2) \\ (3) \end{array} \qquad \begin{array}{c} 5 \\ 5 \end{array} $	(1) OCCURR	T(-) ENCE(2) F	ISCOUNT ACTOR(3)	DISCOUN INGS(+)	TED SAV- COST(-)(4)
	_	(4) TOTAL S			V •	2		
		TUTAL HUNENERGY D			/ COST(-)	(3A2+3Bd	4)	5
	υ.	PROJECT NONENERGY (1) 25% MAX NUNEN a. IF 3D1 IS b. IF 3D1 IS c. IF 3D1b I d. IF 3D1b I	ERGY CALC (2 = UR > 3C < 3C CALC S = > 1 GU T	2F5 X .33) GO TO ITE SIR = TO ITEM 4	M 4 (2F5+3D1)	\$ 810 + 1F =		
4.	FIRS	ST YEAR DULLAR SAV	INGS 2F3+3A+	(3Bld + Y	EARS ECONO	MIC LIFE)	\$ 265.61
5.	TOTA	AL NET DISCOUNTED	SAVINGS (2F5	5+30)				\$ 2,475.49
t.	וע	CUUNTEU SAVINGS RA	TIU (IF < 1	PROJECT D	DES NOT QU	ALIFY)(S	IR)=(5 %:1	F)= <u>1.40</u>

Cost for Head Pura	Prop = 1/1070 00
Cost for Heat Pump (See page 4-60 C	to 4-60E)
Payback = \$\frac{4}{270.00}\$	
SIR = 3.20 (see attached	
	t pumps à more
Repairing the hear cost effective the	en replaces - Hom.

CEDRIC D. O. CHONG & ASSOCIATES, INC.
ONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 06810
Telephone (800) 847-6557
Tuletax: (808) 847-8550

DATE:		JOR No.:	
PROJECT NAME:		-	BY:
SUBJECT:			Snt. 4-39A

LUCATIUN:	REGION NO.	PROJECT NUMBER	
PRUJECT TITLE Repair Broke	in Heat Pumps	FISCAL YEAR	
PHUJECT TITLE Repair Broke UISCRETE PURTIUN HAME Unit	Type 57-I		
ANALYSIS DATE ECONOMIC	LIFE 4 YEARS	PREPARED BY	
1. INVESTMENT A. CUNSTRUCTION COST B. SION (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+18 E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	B+1C)X.9	\$ 270.00 \$ 14.85 \$ 2-7.00 \$ 2-80.6.7	s 280.67
2. ENERGY SAVINGS (+) / COST (- ANALYSIS DATE ANNUAL SAVINGS		D SAVINGS	
FUEL S/MBTU/YR(1) MBT			
A. ELEC \$ 19.92 13.33 B. DIST \$ C. KESID \$ D. NL \$ E. COAL \$ F. TUTAL	\$265.61 \$265.61		•
3. NUMENERGY SAVINGS(+) / COST(A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TAB (2) DISCOUNTED SAVING/CU	-)	<u>\$</u> 0	
B. NONRECURRING SAVINGS(+) ITEM SAVINGS(+) Y CUST (-)(1) O (1) S (2) S (3) S (4) TOTAL S	/ COST(-) EAR OF DISCOUNT CCURRENCE(2) FACTOR(3)	DISCOUNTED SAV- INGS(+) COST(-)(4	1)
C. TUTAL NUMENERGY DISCOUNT	ED SAVINGS(+) / COST(-) (3A2+3Bd4)	5
c. 1F 301b 1S -> 1	LC (2F5 X .33) 3C GO TO 1TEM 4 ALC SIR = (2F5+3D1	·	
4. FIRST YEAR DULLAR SAVINGS 2F	3+JA+(3Bld + YEARS ECO	NOHIC LIFE)	<u>\$ 265.61</u>
5. THAL HET DISCOUNTED SAVINGS	(2F5+3C)		5 897.76
6. DISCOUNTED SAVINGS RATIO (IF	< 1 PROJECT DOES HOT	QUALIFY)(SIR)+(5 + 1	F)= 3.20

i c	Unil Type 57-II (957-IV, 57-VI, 57-VII, 57-IX)
	Energy use without heat pump:
	[(264.6 3al/day) (1 BTU/16-F) (8.33 16/20) (120-70F)]= 32.3 KWH (34/3 ETUH/KW)
	Energy Use with heat pump:
	[(264.6 gal/day)(1 BTU/11-F)(8.33.11/gol)(120-70F)] = 10.8 kwh J(3413 BTUH/KW)(3.0 COP)
	Daily Energy Savings = 32.3-10.8 = 21.5 KWH/Dry
	ANNUAL ENERGY SAVINGS = 21.5 KWH/day x (365 day/yr) = 7,848 KWH/yr
	ANNUAL COST SAVINGS = 7,848 KWH/yr × (\$0.068 /KWH) = \$ 533.63
	Cost for heat pump replacement = \$ 1,700 (see a Hached)
	Payback = $\frac{11}{1,700}$ = 3.2 yrs $\frac{11}{533.63}$ lyr
	SIR = 2.81 (see attached)
	:. Replacement of broken heat pump units would be cost effective.

DRIC D. O. CHONG & ASSOCIATES, INC.
NSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 96819
Telephone (808) 847-6557
Tolefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-40

1 2 2 10	6					FOTIMATOR	37.0	אין האניה אין	1	1	VEFTE
Cold Dollar Hat	31.5	4			\neg	LS time or	2	ום טייאי	STE E	5	יבב ו כ
	QUANTITY	TI			LABOR		EQ.	EQUIPMENT	X	MATERIAL)
TASK DESCRIPTION	#O. OF UNITS	UNIT	WH CMIT	TOTAL	UNIT	COST	PRICE	COST	PRICE	COST	TOTAL
New Heat Pump		2	#	#	39.60	158.40			1120	1120.00	1,278,40
-									-		
	·										
									Sue	TOTAL	1,278.40
		٠							0/14	(157,	191.76
						•			₹ 8	(201) 1.5	147.02
									7AX	(42)	64.69
								ť		(19.)	16.82
									70T	46	1698.69
									243	øL10	0
					·						
					Ŋ						
DA FORM 5418-R, Apr B5 CONTD		-									

LUC	ATIUN: REGION NO PROJECT NUMBER
PKU	CRETE PURTIUN NAME Unit Type 57-11, IV, VII, VII, VIII of IX
צוט	CRETE PURTIUN NAME Unit Type 57-11, IV, VII, VIII of IX
ANA	LYSIS DATE ECONOMIC LIFE \S YEARS PREPARED BY
	INVESTMENT A. CUNSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+1C)X.9 E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E) S 1700.00 S 1700.00 S 170.00 S 170.05 S 170.05
2.	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS
	COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED FUEL \$/MBTU/YR(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
	A. ELEC \$19.92 26.185 unit \$533.63 9.32 \$4,973.43 B. DIST \$ C. KESID \$ D. NG \$ E. COAL \$ The state of the st
	F. TUTAL \$533.63> \$4,973.43
3.	NUMENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABLE A) (2) DISCOUNTED SAVING/CUST (3A X 3A1) \$ 0
	B. NONRECURRING SAVINGS(+) / COST(-) ITEM SAVINGS(+) YEAR OF DISCOUNT DISCOUNTED SAV- CUST (-)(1) OCCURRENCE(2) FACTOR(3) INGS(+) COST(-)(4) (1) \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
	C. TUTAL NUMENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bd4)
	U. PROJECT NONENERGY QUALIFICATION TEST (1) 25% MAX NUNENERGY CALC (2F5 X .33) a. IF 3D1 1S = UR > 3C GO TO 1TEM 4 b. IF 3U1 1S < 3C CALC SIR = (2F5+3D1) + 1F = c. IF 3D1b 1S = > 1 GO TO ITEM 4 d. 1F 3U1b 1S < 1 PROJECT DOES NOT QUALIFY
4.	FIRST YEAR DULLAR SAVINGS 2F3+3A+(3B1d + YEARS ECONOMIC LIFE) \$ 533.(.3
5.	TITAL NET DISCOUNTED SAVINGS (2F5+3C) \$ 4,973.43
	INSCRIBITED SAVINGS DATIO (15 2.) PROJECT DOES NOT QUALIEVISTONAS -151- 2.00

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EDRIC D. O. CHONG & ASSOCIATES, INC.
ONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 98819
Telephone (808) 847-6557
Tuletax: (808) 847-6550

DATE:	JON No.:	
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-42A

LUCA	NT10N:	REGIUN NO.	PROJECT NUMBER	
PKUJ	JECT TITLE <u>Repair Broken</u> CRETE PURTIUN NAME Unit To	Heat Pumps	FISCAL YEAR	-1 TO
nisc	CRETE PURTIUN NAME	The 31-11, 31-11,5	1-94,57- <u>viii.,</u>	51-12
AHAL	YSIS DATE ECONOMIC L	IFE 4 YEARS P	REPARED BY	
	INVESTMENT A. CUNSTRUCTION COST B. SION (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+ E. SALVAGE YALUE F. TUTAL INVESTMENT (1D-1E)	•	\$ 270.00 \$ 14.85 \$ 2.7.00 \$ 2-80.67	<u>\$ 280.67</u>
2.	ENERGY SAVINGS (+) / CUST (+) ANALYSIS DATE ANNUAL SAVINGS.	UNIT COST & DISCOUNTED	SAVINGS	
	FUEL S/MBTU/YR(1) MBTU/			
	A. ELEC \$ 19.92 26.785 B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$ F. TUTAL	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
3.		A)	<u>s</u> 0	-
	B. NONRECURRING SAVINGS(+) / ITEM SAVINGS(+) YEA CUST (-)(1) OCC (1)	COST(-) R OF DISCOUNT URRENCE(2) FACTOR(3)	DISCOUNTED SAV- INGS(+) COST(-)(\$	4)
	C. TUTAL NUMENERGY DISCOUNTED	SAVINGS(+) / COST(-)	(3A2+3Bd4)	\$
	D. PROJECT MONEMERGY QUALIFIC (1) 25% MAX MUMEMERGY CALC a. IF 3D1 15 = UR > 3 b. IF 3U1 15 < 3C CAL c. IF 3D1b 15 = > 1 G d. IF 3U1b 15 < 1 PRU	(2F5 x .33) C CO TO ITEM 4 C SIR = (2F5+301) U TO ITEM 4	\$ 595.21 + 1F *	
4	FIRST YEAR DULLAR SAYINGS 2F3+	JA+(381d + YEARS ECONO	HIC LIFE)	\$ 533.63
5.	TITAL NET DISCOUNTED SAVINGS (2F5+3C)		\$ 1,803.67
ó.	DISCOUNTED SAVINGS RATIO (IF C	1 PROJECT DOES NOT QU	ALIFY)(SIR)=(5 +	1F)= <u>6.43</u>

4-42B

j	Unit Type 57-III
	Energy use without heat pump:
	[(264.6 3al/day) (1 BTU/16-F) (8.33 1b/gel) (120-70F)]= 32.3 KWH (34/3 ETUH/KW)
	Energy Use with heat pump:
	[(264.6 gal/day)(1 BTU/12-F)(8.33 16/gal)(120-70F)]=/0.8 KWH (3413 BTUH/KW)(5.0 COP)
	Daily Energy Savings = 32.3-10.8 = 21.5 KWH/Dmg
	ANNUAL ENERGY SAVINGS = 21.5 KWH/day x (365 day/yr) = 7,848 KWH/yr
	ANNUAL COST SAVINGS = 7,848 KWH/yr × (\$ 0.068 /KWH) = \$ 533.63
	Cost for heat pump replacement = \$ 1,700 (see a Hached)
	Payback = # 1,700 = 3.19 yrs
	SIR = 2.81 (see attached)
	:. Replacement of broken heat pump units would be cost effective.

DRIC D. O. CHONG & ASSOCIATES, INC.

NSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawaii 96819
Telephone (800) 847-6557
Telefax: (808) 847-6550

DATE:	JOH No.:	
PROJECT NAME:	BY:	
SUBJECT:	Sht. 4	-43

Reply Baken Hat	- France	4				ESTIMATOR	CHE	CHECKED BY	SHEET	8	SHEETS
	QUANTITY	TITY			LABOR		EQ	EQUIPMENT	×	MATERIAL	
TASK DESCRIPTION	NO OF UNITS	UNIT	MH	TOTAL	UNIT	COST	PRICE	COST	PRICE	COST	TOTAL
New Heat Pump	~	Q	4	#	39.60	158.40			1120	1120.00	1,278.40
										_	
									Sue	TOTAL	1,278.40
									11/0	(%51/)	191.76
						٠			Pro	(261) 1.5	147.02
									7Ax)	64.69
								•	<u> </u>	٥	16.82
									70T	AC	16.98.69
									543	oL1\$	
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DA FORM 5418-R, Apr 85 CONTD											

LUC	IUI TA	h:				REGION	KO	PR(DJECT	NUMBER _		
PKU	JECT	TITLE	. R.	place	Broken	. Heat	Pumpa	1	FISCAL	YEAR		_
ואנט	CRETE	ב PUK	TUN N	ME	Unit	Type	57-11					-
A NA	LYS15	S DATE		EC	ONOMIC LI	FE 15	YEARS	PRE	PARED	BY		
1.	A. B. C. U. E.	SIOH DESIGNERO SALVA	RUCTIC 5.5 IN COST GY CREE NGE VAL	(109	(1A+1B+1	lc)x.9			2	700.00 93.50 70.00 767.15	_	<u>7.1</u> 5
2.					UST (-) AVINGS, L	JNIT COST	& DISCOU	INTED SA	AVINGS			
			\$/MBTU	/YR(1)	SAVINGS MBTU/Y	(R(2) SA	V1 NGS (3)	FACTO	R (4)	SAVINGS (5)	
	B. C. U.	NESIE NESIE	3		26.785	unit s	533 .63	9.3	32	\$ 4,97	3.43 	
	F.	TUTAL	•				533.63		•		-> 54.9	73.43
3.		ANNUA	L RECU DISCOUN	IKRÎNĞ (IT FACTU	COST(-) +/-) R (TABLE ING/CUST	A)	1) —		<u>\$</u>	<u>ی</u> ٥		
	В.	(1) (2) (3)	CL	5 5 5	GS(+) / C -) YEAR 1) OCCU	COST (+) R OF URRENCE (2	DISCOUN) FACTOR (1T D. 3) 11 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ISCOUN NGS(+)	TED SAV- COST(-)	(4) _ _ _	
	с.	TUTAL	. HUNEN	ERGY DI	SCOUNTED	SAVINGS (+) / COST	(-) (3/	A2+38d	4)	5	
		(1) a	25% MA) i. IF i. IF i. IF	3D1 1S 3D1 1S 3D1 1S 3D1b 1S 3D1b 1S	QUALIFICA RGY CALC = UR > 30 < 30 CALC = > 1 GC < 1 PRUG	(2F5 X . GO TO SIR TO ITEM JECT DOES	33) ITEM 4 = (2F5+3 4 HOT QUAL	3D1) + :	1F =			
4.	FIRS	ST YEA	ע סטבנ	AR SAVI	NGS 2F3+	3A+(3B1d	YEARS E	CONOMI	C LIFE)	\$ 533	3.63
5.	T·)T/	AL NET	DISCL	S DETRUK	AVINGS (2	2F5+3C)					5 4 9	73.43
ď.	וע	CUUNTE	U SAVI	NGS RAT	IU (IF <	1 PROJEC	T DOES NO	T QUAL	IFY)(S	IR)=(5 ·	:1F)=	<u>। । । । । । । । । । । । । । । । । । । </u>

Cost for Heat Po (See page 4-60	ump Repair = >	1270.00
Payback = #27	· · · · · · · · · · · · · · · · · · ·	
SIR = 6,43 (see a Hached		
Repairing the cost effective	Lead pumps . Than replaces	c -14m
	:	
		7

PEDRIC D. O. CHONG & ASSOCIATES, INC.

DNSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 06810

Telephone (800) 847-6557

Telephone (801) 847-6550

DATE:	JON No.:	
PROJECT NAME:	BY	
SUBJECT:	Shi	4-45A

LUCATIUN:	REGIUN NO.	PROJECT NUMBER	
PHUJECT TITLE Repair Broken	Heat Pumps	FISCAL YEAR	
PHUJECT TITLE Repair Broken UISCRETE PURTIUN NAME Unit To	pe 57-11		
ANALYSIS DATE ECONOMIC L	IFE 4 YEARS	PREPARED BY	
1. INVESTMENT A. CUNSTRUCTION COST B. SION (5.5%) C. UESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+ E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)		\$ 270.00 \$ 14.85 \$ 27.00 \$ 2-80.67	<u>\$ 280.67</u>
 ENERGY SAVINGS (+) / CUST (-) ANALYSIS DATE ANNUAL SAVINGS. 		ED SAVINGS	
FUEL S/MBTU/YR(1) MBTU/	S AHNUAL \$ DIS YR(2) SAYINGS(3) FA	SCOUNT DISCOUNTED ACTOR(4) SAYINGS(5))
A. ELEC \$ 19.92 26.785 B. UIST \$ C. KESID \$ U. NU \$ C. COAL 3	unit \$ 533.63	3.38 \$ 1,803	. 67 - -
F. TUTAL	\$ 533.63	••••••	\$ 1,803.6
3. NUMENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABLE (2) DISCOUNTED SAVING/CUST	: A)	<u>s</u> 0	- -
B. NONRECURRING SAVINGS (+) / ITEM SAVINGS (+) YEA CUST (-)(1) OCC (1)	R OF DISCOUNT URRENCE(2) FACTOR(3)	\$	
D. PROJECT NONENERGY QUALIFIC	• •) (SME-3504)	
(1) 25% MAX NUMENERGY CALC a. IF 3D1 IS = UR > 3 b. IF 3U1 IS < 3C CAL c. IF 3D1b IS = > 1 G d. IF 3U1b IS < 1 PRU	(2F5 X .33) C GO TO ITEM 4 .C SIR = (2F5+3D1 U TO ITEM 4) + 1F =	
4. FIRST YEAR DULLAR SAVINGS 2F3+	JA+(3B1d + YEARS ECO	NOMIC LIFE)	<u>\$ 533.63</u>
5. THAL NET DISCOUNTED SAVINGS (2F5+3C)		5 1,803.67
6. DISCOUNTED SAVINGS RATIO (IF C	1 PROJECT DOES NOT	QUALIFY)(SIR)=(5 + 1	1F)= 6.43

K. Unit Type	57-V (57-VII)
Energy use	without heat pump:
[(198.4.gal/)	αη) (Βτυ/16-F) (8.33 16/20) (120-70F)]= 24.2 KWH (34/3 ΕτυΗ/κω)
	with heat pump:
	1/day) (1 BTU/12-F) (8.33.12/gal) (120-70F)] = 8.1 KWH (3413 BTUH/KW) (5.0 COP)
Daily Energy	J Savings = 24.2 - 8.1 = 16.1 KWH/Dmg
ANNUAL ENE	RGY SAVINGS. KWH/day x (365 day/yr) = 5,877 KWH/yr.
	T SAVINGS 877 кшн/уг × (\$0.068/кшн) = \$ 399.64
a tartaman, scance, a	t pump replacement = \$ 1,700
Payback =	# 1,700 = 4.3 yrs # 399.64 lyr
SIR = 2.11	
: Replacem be cost	ent of broken heat pump units would

DRIC D. O. CHONG & ASSOCIATES, INC.
NSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 96819
Telephone (800) 847-6557
Tolelax: (808) 847-6550

DATE:	JOB No.:	
PROJECT NAME:	BY:	
SUBJECT:	snt. 4	-46

P. Raillie Rate Hall	4					ESTIMATOR	CHE	CHECKED BY	SHEFT	ť	HEF TO
12 1 W 10 10 10 10 10 10 10 10 10 10 10 10 10		7						1.		5	
TASK DESCRIPTION	NO. OF UNIT	UNIT	HH	TOTAL	UNIT	COST	UNIT	IT COST	UNIT	T COST	TOTAL
New Heat Pump	_	2	7	#	39.60	158.40			1120	00.021	1,278.40
		tii									
									Sue	TOTAL	1,278.40
										(%51/)	191.76
						•			٥	7. (10%)	147.02
											64.69
									· Con	(19.)	16.82
									70T	46	1698.69
								•			
						•			25.	oL1#	0
DA FORM 5418-R, Apr 85 CONTD											

LUCA	tulT,	Y:				_ REGIO	סא אס		PROJECT	NUMBER _		-
PKUJ	ECT	TITLE	Rep	lace_	Broken	Head	Pump	24	_ FISCA	L YEAR _		
UISC	RETE	PURTI	JN KAME		Unit	Type	, 57-1	V , VI	<u>. </u>			-
ANAL	.YS19	DATE		ECC	DHOMIC LI	FE	S YEARS	S P	REPARED	BY		
	A. B. C. U. E.	ESTMENT CUNSTR SIOH DESIGN ENERGY SALVAG TUTAL	UCTIUN (5.5% COST (CREDIT E VALUE	CALC	(1A+1B+1	C)X.9			-	1700.00 93.50 170.00 1767.15	<u>5</u>	<u>.1</u> 5
					OST (-) AVINGS, U	NIT CO	ST & DISC	COUNTER	SAVING	S		
	FUEL		COST /MBTU/1	rR (1)	SAVINGS MBTU/Y	R(2)	NNUAL \$ SAVINGS(0210 0A3 (E	DUNT TOR (4)	DISCOUNTI SAVINGS	EO (5)	
	C. U.	ELEC DIST RESID NG COAL	\$		20.058		399.64		.32	\$ 3,72	<u></u>	
	F.	TUTAL				 .	399.6	±			> <u>\$3,72</u>	4.64
3 .	NUNI A.	ANNUAL (1) DI	RECUKR SCOUNT	RING (+ FACTUR	CDST(-)* -/-) R (TABLE ING/CUST	A)	3A1) -		<u>s</u>	0		
	B.	(1) (2) (3)	SAVI CUST \$	INGS (+ 「 (-)(1	SS(+) / C) YEAR L) OCCU	OST(-) OF URRENCE	01SC(2) FACT(OUNT OR (3)	DISCOU INGS (+	NTED SAV) COST(-	-)(4) - -	
	_	•	TAL S						5			
					COUNTED		•	051(-)	(3A2+3B	d4) _.	2	
	D.	(1) 25° a. b. c.	MAX N IF 30 IF 31 IF 30	NUNE NER 01 IS = 01 IS <	QUALIFICA RGY CALC = UR > 3C < 3C CALC = > 1 GU < 1 PRUJ	(2F5 X GO TO S TO ITI	.33) D ITEM 4 IR = (2F! EM 4	5+301)		229.1	<u>3</u>	
4.	FIRS	T YEAR	DULLAR	SAVI	NGS 2F3+3	A+(3B1	+ YEARS	S ECONO	MIC LIF	E)	\$ 399.	64
5.	TIJTA	L NET I)150001	TED SA	VINGS (2	F5+3C)					53,72	<u>+.</u> 64
6.	DI SC	עETאטט	SAVING	S RATI	U (IF C	1 PRDJE	CT DOES	NOT QU	ALIFY)(SIR)=(5	:1F)= 2.	11

(See page	4-60 C-to 4-	- (0C)
	m	
Payback =	# 399.64	0.68 year
SIR = 4.8 (see atlac	hed	
Repairing	the heat pu	aps is more
cost effec	tive It on re	pps is more places of them.
,		
	(DATE:	TION NO

SEDRIC D. O. CHONG & ASSOCIATES, INC.
NSULTING MECHANICAL & ELECTRICAL ENGINEERS
130-E NORTH King Street Honolulu, Hawall 96819
Telephone (808) 847-6557
Tuletax: (808) 847-8550

DATE:	JON No.	
PROJECT NAME:		BY:
SUBJECT:		Snt. 4-48A

Luc	AT LUN:	REGION NO. PROJECT NUMBER	
PKU.	JECT T	TITLE Repair Broken Heat Pumps FISCAL YEAR	
u1S	CRETE	PURTIUN NAME Unit Type 57-II & 57-III	
AHA	LYSIS	DATE ECONOMIC LIFE YEARS PREPARED BY	
1.	A. CI B. S C. W U. E E. S	STHENT CUNSTRUCTION COST SION (5.5%) UESIGN COST (10%) ENERGY CREDIT CALC (1A+1B+1C)X.9 SALVAGE VALUE TUTAL INVESTMENT (1D-1E)	<u>\$ 280.67</u>
2.		GY SAVINGS (+) / CUST (-) YSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS	
	FUEL	COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU/YR(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
	C. K	ELEC \$ 19.92 20.058/wit \$ 399.64 3.38 \$ 1,350 DIST	<u>e</u> .78 - - - -
	F. T	TUTAL 5399.C4	> \$ 1,350.78
3.	A. A	NERGY SAVINGS(+) / COST(-) ANNUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABLE A) (2) DISCOUNTED SAVING/CUST (DA X DA1) 5 0	
	1	NONRECURRING SAVINGS(+) / COST(-) ITEM SAVINGS(+) YEAR OF DISCOUNT DISCOUNTED SAV- CUST (-)(1) OCCURRENCE(2) FACTOR(3) INGS(+) COST(-)((1)	
	C. T	TUTAL HUNENERGY DISCOUNTED SAVINGS(+) / COST(-) (3A2+3Bd4)	5
		PROJECT NONENERGY QUALIFICATION TEST (1) 25% MAX NUNENERGY CALC (2F5 x .33) a. If 3D1 IS = UR > 3C CO TO 1TEM 4 b. IF 3D1 IS < 3C CALC	
4	FIRST	T YEAR DULLAR SAYINGS 2F3+3A+(3B1d + YEARS ECONOMIC LIFE)	\$ 399.64
5.	TITAL	L NET DISCOUNTED SAVINGS (2F5+3C)	5 1,350.78
6.	UISCU	UUNTEU SAVINGS RATIU (IF < 1 PROJECT DOES NOT QUALIFY)(SIR)=(5 +	1F)= <u>4.8/</u>

	Unit Type GO-I	
	Energy use without heat pur	70:
	[(198.49al/fay)(1BTU/16-F)(8 (34/3BTUH/KW)	
	Energy Use with heat pur	np
	[(198.4 gal/day) (1 BTU/12-F) (8) (3413 BTUH/K	3.33 11/g al)((20-70F)] = 8.1 kmH ω)(3.0 cop)
	Daily Energy Savings: = 24.	
	ANNUAL ENERGY SAVINGS = 16.1 KWH/day x (345	
	ANNUAL COST SAVINGS = 5,877 KWH/yr x (\$ 0	0.068/KWH) = \$ 399.64
	Cost for heat pump replaces (see attached)	
	Payback = # 1,700 \$ 399.64 /y	= 4.3 yrs
	SIR = 2.11	(see attached)
	:. Replacement of broken be cost effective.	heat pump units would
EDBIC D O CHON	G & ASSOCIATES, INC. DATE:	JOB No.:

EDRIC D. O. CHONG & ASSOCIATES, INC.
NSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 96819
Telephone (800) 847-6557
Tolefax: (808) 847-6550

DAIE	300 No.:		
PROJECT NAME:		BY:	
SUBJECT:		Sht.	4-49

Roselice Rocks	. 6				-	FSTIMATOR	CH.	CHECKED BY	SHET	35	HFFTS
TOTAL MAISTER THAT	35	4			- 1						
TASK DESCRIPTION	NO OF LIMIT	וואוז	NH/	1070	LABOR		EQ.	EQUIPMENT	X P	MATERIAL + I	TOTAL
	STINU 8TINU	MEAS	TINS.	HAS	PRICE	COST	PRICE	COST	PRICE	COST	
New Heat Permo		2	4	#	39.60	158.40			1120	1120.00	1,278.40
									SUR	TOTAL	1,278.40
									JH/O	(15%)	191.76
						•			₹ 8	7. (10%)	147.02
									7Ax	(44)	64.69
								~		9	16.82
									ToT	46	1698.69
								•			•
									243	øL10	2
										•	
								·			
DA FORM 5418-R, Apr 85 CONTD											

		REGION NO.		
PKU	CRETE PURTIUN NAME Unit	Heat Pumps	FISCAL YEAR	
UISC	CRETE PURTIUN NAME Unit	Type 60-1		
ANAI	LYSIS DATE ECONOMIC LI	FE \S YEARS	PREPARED BY	
	A. CUNSTRUCTION COST B. SIGH (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+1 E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	C)X.9	\$ 1700.00 \$ 93.50 \$ 170.00 \$ 1767.15	<u>\$ 1767.1</u> 5
2.	ENERGY SAVINGS (+) / CUST (-) ANALYSIS DATE ANNUAL SAVINGS, U	NIT COST & DISCOUNTE	D SAVINGS	
	COST SAVINGS FUEL S/MBTU/YR(1) MBTU/Y	•	COUNT DISCOUNTED CTOR(4) SAYINGS(5)
	A. ELEC \$ 19.92 20.058, B. DIST \$ C. KESID \$ D. NG \$ E. COAL \$		9.32 \$3,724	. <u>.</u> 64 - - - -
	F. TUTAL	\$ 399.64	*******	> 5 3,724.64
3.	NUNENERGY SAVINGS(+) / COST(-) A. ANNUAL RECUKRING (+/-) (1) DISCOUNT FACTOR (TABLE (2) DISCOUNTED SAVING/CUST	A)	s o	-
	B. NONRECURRING SAVINGS(+) / C ITEM SAVINGS(+) YEAR CUST (-)(1) OCCU (1) S (2) S (3) S (4) TOTAL S	OF DISCOUNT		
	C. TUTAL NUMENERGY DISCOUNTED	SAVINGS(+) / COST(-)	(3A2+3Bd4)	\$ 1,229.13
	D. PROJECT NONENERGY QUALIFICA (1) 25% MAX NUNENERGY CALC a. IF 3D1 IS = UR > 3C b. IF 3D1 IS < 3C CALC c. IF 3D1b IS = > 1 GU d. IF 3U1b IS < 1 PRUJ	(2F5 X .33) GO TO 1TEM 4 SIR = (2F5+3D1) TO ITEM 4		
4.	FIRST YEAR DULLAR SAVINGS 2F3+3	A+(381d + YEARS ECON	OMIC LIFE)	\$ 399,64
5.	TITAL NET DISCOUNTED SAVINGS (2	F5+3C)		5 3,724.64
6.	DISCOUNTED SAVINGS RATIO (IF C	1 PROJECT DUES NOT Q	WALIFY)(SIR)=(5 +	1F)= 2.11

	Cost for Heat Pump Rep	air = 11270.00
	Cost for Heat Pump Rep (See page 4-60 Cto)	1-60E)
	Payback = \$\frac{4}{\pm 270.00}\$\$\$\frac{1}{\pm 399.64}\$\$\$\$	= 0.68 yian
	SIR = 4.81	
	(see attached	
	Repairing the heat p cost effective than	unps is more Eplacing Them.
		7
SEDRIC D. O. CHONG 8	ASSOCIATES INC DATE:	JOB No.:

PROJECT NAME:

SUBJECT:

BY:

Snt. 4-5/A

nsulting mechanical & electrical engineers

130-E North King Street Honolulu, Hawall 96819 Telephone (809) 847-6557 Tulutax: (808) 847-8550

LUCAT						ROJECT NUMB!		
PKUJE	CT	TITLE <u>Repai</u> PURTIUN NUME	- Broken	Heat Pur	200	FISCAL YEAR	·	
UISCR	ETE	PURTIUN HAME	Unit Ty	pe 60-I	- L			
AKALY	' \$1\$	DATE	ECONOMIC LIF	E <u>+</u> Y	EARS PR	EPARED BY		
A B C U		STMENT CUNSTRUCTION CO SION (5.5%) UESIGN COST (/ ENERGY CREDIT (SALVAGE VALUE TUTAL INVESTMEN	070) Calc (1A+1B+1C)x.9		\$ 270. \$ 14. \$ 2-7. \$ 2-80.	45 00 (.7	280.67
		GY SAVINGS (+) YSIS DATE ANNU		IT COST &	DISCOUNTED	SAVINGS		
F	UEL	COST \$/MBTU/YR	SAVINGS (I) MBTU/YR	AHNUAL (2) SAYIN	\$ DISCO DISCO FACT	OUNT DISCOMO D	JATEO NGS (5)	
B C U		ELEC \$ 19.92 DIST \$ KESID \$ NG \$ COAL \$	_ 20.058 lu					
F	•	TUTAL		<u> </u>	9.64	****	>	\$ 1,350.78
	١.	NERGY SAVINGS (- ANNUAL RECURRII (1) DISCOUNT F/ (2) DISCOUNTED	YĞ (+/-) ACTUR (TABLE A	JA X JAl)		\$ 0		
E			AVINGS(+) / CO GS(+) YEAR (-)(1) DCCUR	OF D				
C		TUTAL HUNENERG	T DISCOUNTED S	AVINGS(+)	/ COST(-) (;
).	PROJECT NONENEI (1) 25% MAX NUI . IF 301 b. IF 301 c. IF 301	RGY QUALIFICAT	ION TEST 2F5 X .33) GO TO 1TE SIR = TO ITEM 4	M 4 (2F5+3D1) +	\$ 445.70	<u></u>	
4 F	IRS	T YEAR DULLAR S	SAVINGS 2F3+3A	+(381d + Y	EARS ECONOM	(IC LIFE)	3	399.64
5. T	'ITAI	L NET DISCUUNTI	D SAVINGS (2F	5+30)			2	1 350 78
6. U	ISC	UUNTED SAVINGS	RATIU (IF < 1	PROJECT D	OES HOT QUA	LIFY)(SIR)=	(5 + 1F	1= 4.81

M	Unil Type 60-II
	Energy use without heat pump:
	[(330.7 gal/fay) (1 BTU/16-F) (8.33 16/gal) (120-70F)]- 40.4 KWH Tay
	Energy Use with heat pump:
	[(330.7 gal/day)(1 BTU/11-F)(8.33 16/gal)(120-70F)]= 13.5 kwh (3413 BTUH/KW)(3.0 COP)
	Daily Energy Savings = 40.4-13.5 = 26.9 KWH/Day
	ANNUAL ENERGY SAVINGS = 26.9 KWH/day x (365 day/yr) = 9,819 KWH/yr
	ANNUAL COST SAVINGS = 9,819 KWH/Gr × (\$0.068/KWH) = \$ 667.69
	Cost for heat pump replacement = \$ 1,700 (see attached)
	Payback = #1,700 = 2.5 yrs
	SIR = 3.52 (see attached)
	:. Replacement of broken heat pump units would be cost effective.

DRIC D. O. CHONG & ASSOCIATES, INC.
NSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawall 96819
Telephone (800) 847-6557
Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Snt. 4-52

TASK DESCRIPTION Heat Pump	Theplace Boton Hat	gung	4				ESTIMATOR	CHEC	CHECKED BY	SHEET	₽Q.	SHEETS
Nak description Wo, of Junt Way Toyle Unit Unit Way Toyle Unit Way		QUANT				ABOR		EQ.	JIPMENT	×	TERIAL	
1 64 4 39.60 158.40 1120 (126.00) Superstand Office (157.) For (4.7) Comp (1.7) Tor (4.7) Tor (4.7) Tor (4.7) Superstand Tor (4.7) Tor (4.7) Tor (4.7)		NO. OF UNITS	- 80	HX FIIN	TOTAL	UNIT	COST	PRICE	COST	UNIT PRICE	COST	TOTAL
1												
\$\line{\langle} \frac{\langle}{\langle} \frac{\langle}	2 Heat Pu	_	2	4		39.60	158			1120	1120.00	1,278.40
Sue [27π L OM (1572)] (10π)												
(123) (12												
(157a) (157b) (27c) (2c) (15c) (1										Sue	\neg	1,278.40
(中央): (10元)										0/11)	191.76
74x (47)							•			to a	(201) 1.5	147.02
Coup (19.)										7Ax	(44)	64.69
70TAL Say \$110									•	<u></u>		16.82
70TAL 5ay \$170												
0-1-1# K-NS										707	1 4	1698.69
0												
										543		9
	•											
											•	

LUCAT	IUN	:	 		REGION	ND.	PROJEC'	NUMBER	
PKUJE	CT	TITLE F	Replace	Broken	Heat	Pumpa.	FISC.	AL YEAR	
DISCR	RETE	PURTIUN	NAME	Unit	Type	60-I		 	
ANALY	rsis	DATE	EC	DNOMIC LIF	E 15	YEARS	PREPARE	BY	
£ 0 1.	A. B. J.	ENERGY CR SALVAGE V	ST (109. EDIT CALC	(1A+1B+10)x.9		\$ \$ \$ \$	1700.00 93.50 170.00 1767.15	•
2. E	ENER	GY SAVING YSIS DATE	S (+) / CI ANNUAL S	UST (-) AVINGS, UN	IT COST	& DISCOUN	TED SAVIN	SS	
		\$/MB	TU/YR(1)	MBTU/YR	(2) SAV	1 NGS (3)	FACTOR (4)	DISCOUNTED SAVINGS (5	5)
C L		ELEC S / S PRODUCT S PRODU				67.69		\$ (0,22	.2 .87 - - - -> <u>\$(_{0,222.87}</u>
3. 1	NUNE	NERGY SAV ANNUAL RE (1) DISCO	INGS(+) / CURRING (DUNT FACTO BUNTED SAV	COST(-)	.)		<u>s</u> - <u>s</u>	<i>O</i>	- 3(8,222.0)
		(1) (2) (3) (4) TOTAL	SAVINGS (+ CUST (-)(1) OCCUR 	OF RENCE (2)	FACTOR (3	1) INGS (UNTED SAV- +) CDST(-)	(4) - -
C		TUTAL HUN	ENERGY DI	SCOUNTED S	AVINGS (+	·) / COST(-) (3A2+3	Bd4)	2
L	٠.	(1) 25% H a. I b. I c. 1	AX NUNENE F 301 IS F 301 IS F 301b IS	QUALIFICAT RGY CALC (= UR > 3C < 3C CALC = > 1 GU < 1 PRUJE	2F5 X .3 GO TO I SIR TO ITEM	33) TEM 4 = (2F5+3D 4	1) + 1F =	-,053.55	<u>.</u>
4. F	IRS	T YEAR DU	LLAR SAVI	NGS 2F3+3A	+(3Bld +	YEARS EC	ONOMIC LI	FE)	5 667.69
5 . T	ATC	L NET DIS	CUUNTED S	AVINGS (2F	5+3C)				5 6, 222,87
6. U	150	UUNTEU SA	VINGS RAT	10 (IF < 1	PROJECT	DOES NOT	QUALIFY)	(SIR)=(5 +	1F)= 3.52

Cost for He	ati Pump Repa	= 1/270.00	
(See page	4-60 cto 4	c = \$1270.00 -606)	
Payback =	727000 =	0.40 yian	,
	# 667.69	Y The second sec	
SIR = 8 (see attac	.04		• • • • • • • • • • • • • • • • • • • •
(see attac	hed		<u>.</u>
Repairing	the heat pur	nps is more	
cost effec	the heat pure time than 12	placing them.	·
	• • • • • • • • • • • • • • • • • • • •		
		en en en en en en en en en en en en en e	:·
			
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	DATE	LIORNO	

NSULTING MECHANICAL & ELECTRICAL ENGINEERS
130-E North King Street Honolulu, Hawall 06810
Telephone (808) 847-6557
Tulefax: (808) 847-6550

DATE:	101	No.:	
PROJECT NAME:			BY:
SUBJECT:			Snt. 4-54A

LUCATIUN:	REGION NO.	PROJECT NUMBER	
PHUJECT TITLE Repair Broke	n Heat Punco	FISCAL YEAR	
PHUJECT TITLE <u>Repair Broke</u> UISCRETE PUNTIUN NUME Unit T	ype co-II		
AMALYSIS DATE ECOHOMIC !	LIFE 4 YEARS	PREPARED BY	
1. INVESTMENT A. CUNSTRUCTION COST B. SION (5.5%) C. UESIGN COST (10%) U. ENERGY CREDIT CALC (1A+18: E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	+1C)x.9	\$ 270.00 \$ 14.85 \$ 27.00 \$ 2-80.69	\$ 280.67
2. EHERGY SAVINGS (+) / CUST (-) ANALYSIS DATE ANNUAL SAVINGS.		TED SAVINGS	
FUEL S/MBTU/YR(1) MBTU	GS ANNUAL S D /YR(2) SAYINGS(3)	ISCOUNT DISCOUNTED FACTOR (4) SAVINGS (5))
A. ELEC \$ 19.92 33.51. B. DIST \$ C. RESID \$ D. NU \$ E. COAL 3			
F. TUTAL	3667.69	•••••	-> <u>\$2,256.</u> 79
3. NUMEHERGY SAVINGS(+) / COST(- A. AMMUAL RECURRING (+/-) (1) DISCOUNT FACTUR (TABL (2) DISCOUNTED SAVING/CUS) E A)	<u> </u>	
B. HOHRECURRING SAVINGS(+) / ITEM SAVINGS(+) YE CUSY (-)(1) OC (1)	COST(-) AR UF DISCOUNT CURRENCE(2) FACTOR(3	DISCOUNTED SAY- INGS(+) COST(-) S S	(4) -
C. TUTAL NUMENERGY DISCOUNTE	U SAVINGS (+) / COST (-) (3A2+3Bd4)	5
D. PROJECT NONEMERGY QUALIFI (1) 25% MAX MUMEMERGY CAL a. If 301 15 - UR > b. If 301 15 < 30 CA c. If 301b 15 - > 1 d. IF 301b 15 < 1 PR	C (265 X .33) C CO TO ITEM 4 LC SIR = (265,+30 CO TO ITEM 4	-	-
4. FIRST YEAR DULLAR SAVINGS 2F3	+JA+(JBld + YEARS EC	ONOMIC LIFE)	5 667.69
5. THAL NET DISCOUNTED SAVINGS	(285+30)		5 2,256.79
6. UISCUUNTED SAVINGS RATIU (IF	< 1 PROJECT DOES NOT	QUALIFY)(SIR)=(5 +	111-8.04

n Unit Tupe 60-III	
Energy use without heat pump:	
(244.6.9al/fay) (1 BTU/16-F) (8.33 lb/gal) (34/3 BTUH/KW)	(120-70F)]= 32.3 KWH
$(^{3}34/3 BTUH/K\omega)$	
Energy Use with heat pump.	
(764/ 94/12) (1 BTU/11 C) (8 33 16/ 1))(120-70 E)] = 10 8 KWH
(2C4.C gal/day) (1 BTU/11-F) (8.33 11/gal) (3413 BTUH/KLU) (3.0)	COP)
	1
Daily Energy Savings = 32.3-10.8	and the second s
ANNUAL ENERGY SAVINGS = 21.5 KWH/day x (365 day)/yr) =	7 848 KWH/
ANNUAL COST SAVINGS = 7848 KWH/Gr x (\$ 0.068 /KWH) = \$ 523.66
Cost for heat pump replacement = (see attached)	\$ 1,700
bere a same management of the control of the contro	
Payback = \$\frac{1}{3},700 = 3.	,2.yrs
SIR = 2.81 (see	atlacked)
. Replacement of broken heat pur	mp units would
Replacement of broken heat pur be cost effective.	
· · · · · · · · · · · · · · · · · · ·	

DRIC D. O. CHONG & ASSOCIATES, INC.

NSULTING MECHANICAL & ELECTRICAL ENGINEERS

2130-E North King Street Honolulu, Hawaii 96819

Telephone (800) 847-6557

Telefax: (808) 847-6550

DATE:	JON No.	
PROJECT NAME:	<u>-</u> 1	BY:
SUBJECT:		Sht. 4-55

-	e				1	1		200		į	1
Leplace Dooler Hat	25.	4				SIIMAIUR	E L	CHECKED BI	SHE E	5	6613
	QUANTITY	ΙΤΥ			LABOR		EQ	EQUIPMENT	M.A	MATERIAL	
TASK DESCRIPTION	NO. OF UNITS	UNIT	H. A.	TOTAL	UNIT	COST	UNIT	COST	PRICE	COST	TOTAL
New Heat Pump	~	2	#	#	39.60	158.40			1120	1120.00	1,278.40
		·							-		
			:						SUE	TOTAL	1,278.40
									11/0	(157,	191.76
						•			Pa	7.((10%)	147.02
									7Ax	(4%)	64.69
									· Bow	0 (19.)	16.82
									ToT	46	1698.69
								•			•
						•			24.	oL1\$	9
	·										
										-	
						•					
DA FORM 5418-R, Apr 85 CONTD											

LUC	ATIUN:	REGION NO.	PROJECT NUMBER	
PKU	UECT TITLE <u>Replace Broke</u> CRETE PURTIUN NAME Unit	n Heat Pumps	FISCAL YEAR	
וצנע	CRETE PURTIUN NAME Unit	Type 60-III		
ANA	LYSIS DATE ECONOMIC L	IFE 15 YEARS	PREPARED BY	
1.	INVESTMENT A. CUNSTRUCTION COST B. SIOH (5.5%) C. DESIGN COST (10%) D. ENERGY CREOIT CALC (1A+1B+ E. SALVAGE VALUE F. TUTAL INVESTMENT (10-1E)	1C)X.9	\$ 1700.00 \$ 93.50 \$ 170.00 \$ 1767.15	<u>\$ 1767.1</u> 5
2.	ENERGY SAVINGS (+) / CUST (-) ANALYSIS DATE ANNUAL SAVINGS.	UNIT COST & OISCOUN	TEO SAVINGS	
	COST SAVING FUEL \$/MBTU/YR(1) MBTU/	YR(2) SAVINGS(3)	FACTOR (4) SAVINGS (5)
	A. ELEC \$19.92 26.785 B. DIST \$ C. RESID \$ D. NG \$ E. COAL \$	2 2 3 3 3		<u>-</u>
	F. TUTAL	\$ 533.66	*******	·> <u>5 4,973</u> .71
3.	NUMENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) OISCOUNT FACTOR (TABLE (2) DISCOUNTED SAVING/COST	A)	<u>s</u> <u>o</u> <u>s</u> <u>o</u>	-
	B. NONRECURRING SAVINGS(+) / ITEM SAVINGS(+) YEAR CUST (-)(1) OCC (1)	R OF DISCOUNT	DISCOUNTED SAV- INGS(+) COST(-)(\$ 3	(4) - -
	C. TUTAL NUMENERGY DISCOUNTED	SAVINGS(+) / COST(-) (3A2+3Bd4)	\$
	U. PROJECT NONENERGY QUALIFIC (1) 25% MAX NUNENERGY CALC a. IF 3D1 IS = UR > 3 b. IF 3D1 IS < 3C CAL c. IF 3D1b IS = > 1 G d. IF 3D1b IS < 1 PRO	(2F5 X .33) C GO TO ITEM 4 C SIR = (2F5+3D O TO ITEM 4		<u>.</u>
4.	FIRST YEAR DULLAR SAVINGS 2F3+	3A+(3Bld + YEARS EC	ONOMIC LIFE)	5 533.66
5.	TITAL NET DISCOUNTED SAVINGS (2F5+3C)		34,973,71
ó.	DISCOUNTED SAVINGS RATIO (IF C	1 PROJECT DOES NOT	QUALIFY)(SIR)=(5 +	1F)= 2.81

}											ļ	: 			· 	<u>.</u>	: 		 		ļ	<u>: </u>	 	!		; -	: :
	\	. <u></u> !									<u> </u>				: 		!	:	!			! -	! :	: ,	: :		
	!	; 	!				20	5.4	fu	_	He	al		um	À.	Re	pa	<u> </u>	=	7/	27	0.	00) -	: 	·;	
								بع	يبا	<u>pa</u>	سير	<i>4</i>		ia	.C	to	4.	÷ 6,4) E)	! 	!	• . 		: :		
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SUBJECT:

Snt. 4-57A

Actophone (800) 647-6557 Tutotax: (808) 847-6550

LUCA	ATION:	REGION NO.	PROJECT NUMBER	
PKU.	JECT TITLE Repair Broken +	Heat Pumps	FISCAL YEAR	مرو جائلات اشارو برغور
	CRETE PURTIUN NAME Unit Typ	e 60-III		
AHAI	LYSIS DATE ECONOMIC LIFE	4 YEARS	PREPARED BY	· · · · · · · · · · · · · · · · · · ·
1.	INVESTMENT A. CUNSTRUCTION COST B. SION (5.5%) C. DESIGN COST (10%) U. ENERGY CREDIT CALC (1A+1B+1C) E. SALVAGE VALUE F. TUTAL INVESTMENT (1D-1E)	X.9	\$ 270.00 \$ 14.85 \$ 27.00 \$ 2-30.67	\$ 280.67
2.	ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNI	T COST & DISCOUNTE	D SAVINGS	
	FUEL S/MBTU/YR(1) MBTU/YR(ANNUAL \$ DIS (2) SAVINGS(3) FA	COUNT DISCOUNTED CTOR (4) SAYINGS (5)
	A. ELEC \$ 19.92 26.785/u. B. DIST 5 C. KESID 5 U. NG 5 E. COAL 5	\$ 533.66	3.38 \$ 1,803	77
	F. TUTAL	\$ 533.66	••••••	> \$ 1,803.77
3.	NUNEHERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) (2) DISCOUNTED SAVING/CUST (3)) DA X 3A1)	<u>s</u> 0	· -
	B. NONRECURRING SAVINGS (+) / COS ITEM SAVINGS (+) YEAR C CUST (-)(1) DCCURR (1) 5 (2) 5 (3) T	DISCOUNT	DISCOUNTED SAV- INGS(+) COST(-)(3	4)
	C. TUTAL NUMENERLY DISCOUNTED SA	KVINGS(+) / COST(-)	(3A2+3Bd4)	5
	D. PROJECT NONENERGY QUALIFICATION (1) 25% MAX NUNENERGY CALC (2) a. 1F 3D1 1S = UR > 3C a. 1F 3U1 1S < 3C CALC c. 1F 3U1b 1S = > 1 CU 7 d. 1F 3U1b 1S < 1 PRUJECT	2F5 X .33) CO TO 1TEM 4 SIR = (2F5+3D1) TO ITEM 4		
4	FIRST YEAR DULLAR SAVINGS 2F3+3A4	(3B1d + YEARS ECO		\$ 533.66
	THAL NET DISCOUNTED SAVINGS (255			<u>5 1,803.77</u>
6.	UISCOUNTED SAVINGS RATIO (IF < 1	PROJECT DOES NOT	+ 2)=(RIZ)(Y71JAUK	1F)= 6.43

Unit Type 71-I	
Energy use without heat pur	mp
	8.33 [b/gal) (120-70F)]= 40.4 KWH)
Energy Use with heat pu	· · · · · · · · · · · · · · · · · · ·
(330.7 gal/day) (1 Blu/11-15) (3413 BTUH/	(8.33: 16/gal)(120-70F)] = 13.5 KWH KW)(3.0 COP)
	.4-13.5 = 26.9 KWH/Day
ANNUAL ENERGY SAVINGS = 26.9 KWH/day x (36	5 daylyr) = 9,819 KWH/yr
ANNUAL COST SAVINGS $= 9819 \frac{k\omega H}{yr} \times (4)$	
Cost for heat pump replace (see attached)	
Payback = \$1700 \$ 667.69 1	
SIR = 3.52	(see attached)
:. Replacement of broken be cost effective.	heat pump units would
EDRIC D. O. CHONG & ASSOCIATES, INC. DATE:	JOB No.:

CONSULTING MECHANICAL & ELECTRICAL ENGINEERS
2130-E North King Street Honolulu, Hawali 96819
Telephone (808) 847-6557 Telefax: (808) 847-6550

DATE:	JOB No	.:
PROJECT NAME:		BY:
SUBJECT:		Sht. 4-58

Replace Broken Hat	Fund	19				ESTIMATOR	CHEC	CHECKED BY	SHEET	₽	REETS
	QUANTITY	IITY			LABOR		EQU	EQUIPMENT	X	MATERIAL	
TASK DESCRIPTION	MO. OF UNITS	UNIT	HIN	TOTAL	PRICE	COST	PRICE	COST	UNIT	COST	TOTAL
New Heat Pump	-	2	4	#	39.60	158.40			1120	1120.00	1,278.40
								İ	Sue	TATAL	1,278.40
									OLH	(15%)	191.76
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PKU	JECT	TITLE	<u>_</u> f	كعما	ace	Br	akes	a He	at	Pump	Δ	FISC	AL YEAR		
פוט	CRETE	PUKT	וטא	NAME			Lnit	Ty	pe	71 - 17	- -				
AKA	LYS IS	DATE			E(HONOS	IC L	IFE _	15	YEARS	5	PREPARE	D BY		
1.	A. B. C. U. E.	STMEN CUNST SIGH UESIG ENERG SALVA TUTAL	RUCT Sin CO SY CR GE V	ST (EDIT ALUE	O CALI	C (1A		lc)x.	9			; ; ;	1700.00 93.50 170.05 1767.15	<u>0</u>	<u>1.1</u> 5
2.		RGY SA .YSIS						ו דואנ	COST	s DISC	דאטס:	ED SAVIN	GS		
		•	\$/MB	וץ/עד	R(1)	Н	BTU/	rR(2)	SA	VINGS (3	3) F.	ACTOR (4)	DISCOUNT! SAVINGS	ED (5)	
	C. U.	ELEC DIST RESID NG COAL	3			33	3.512	<u>lun</u> it	ニスススス			9.32	\$ (3,25	22.87	
	F.	TUTAL				_			5	667.69	-			> <u>5 (,,2</u>	<u> </u>
3.	NUNE A.	ENERGY ANNUA (1) D (2) U	L RE	CUKR JUNT J	ÍNG FACTO	(+/-) UR (T	ABLE	A)	X 3A	u) —		<u>s</u> <u>s</u>	0		
	В.	ITEM		SAVIII COST	∙) 2 ЭИ (-)	+) (1)	YEAR	₹ OF		DISCO			UNTED SAV +) COST(-		
	c.	TUTAL	. HUN	ENER	GY D	ISCOL	INTED	SAVI	NGS ((+) / C() T 2C) (3A2+3	B d 4)	\$	
	υ.	i a	25% H	AX N F 3D F 3U F 3D	UNEN! 1 IS 1 IS 1b I!	ERGY = UR < 30	CALC 1 > 30 CALC 1 G	(2F5 GO C TO	X TO SIR ITER	33) ITEM 4 = (2F	5+3D1) + 1F =	2,053.55	_	
4.	FIRS	ST YEA	R DU	LLAR	SAV	1 NGS	2F3+	3A+ (3	Bld	+ YEARS	ECO	NOMIC LI	FE)	\$ 66-	1.69
5.		AL NET					•		•						22.87
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CEDRIC D. O. CHONG & ASSOCIATES, INC.
ONSULTING MECHANICAL & ELECTRICAL ENGINEERS
130-E NORN KING STROUT HONOLULU, HAWAII 06810
Telephone (808) 647-6557
Tululax: (808) 847-6550

DATE:	JOU NO .:	
PHOJECT NAME:		BY:
SUBJECT:		Snt. 4-60A

LUCAT			R1	GIUN NO	PROJECT	NUMBER		
PKUJE	CT TITLE	Repair (3 roken H	ent Pumps	FISCA	L YEAR		
UISCR	ETE PURTI	UN NAME	init Type	- TI-I				
AKALI	ISIS DATE	£C	OHOMIC LIFE	4 YEARS	PREPARED	BY		
E C U	3. SIOH (D. DESIGN J. ENERGY E. SALVAU	UCTION COST S.S.7) COST (107° CREDIT CALC E VALUE INVESTMENT ((1A+1B+1C)X	.9	λ. Σ.	270.00 14.85 27.00 2-80.67	<u>\$ 280.67</u>	
		/INUS (+) / C PATE ANNUAL S		COST & DISCO	UNTED SAVING	is .		
;	FUEL S	COST MBTU/YR(1)	SAVINGS ` MBYU/TR(2	L JAUNHA (E) 2DAIYAZ	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
1 (1	L. COAL	}		f \$667.69			- - -	
}	F. TUTAL			5667.69		*********	> 52,256.7	9
	A. AMMUAL (1) DI	SAVINGS(+) / RECURRING (SCOUNT FACTU SCOUNTED SAV	+/-) R (TABLE A)	x 3A1)	<u> </u>	0	-	
· 1	(1) (2) (3)	CUST (-)(YEAR UF 1) OCCURRE	(-) DISCOU NCE(2) FACTOR	DISCOU 1 DISCOU 1 DISCOU 2 DISCOU	·) cost(-)(4)	
(. TUTAL	MUNENERLY DI	SCOUNTED SAV	1HGS(+) / COS	T(-) (3A2+3E	3d4)	5	
ı	(1) 2: 	1F 301b 1S	RCY CALC (2F • UR > 3C G < 3C CALC • > 1 CU TO	5 X .33) 0 TO 1TEM 4 SIR + (2F5+	301) + 1F =	<u> </u>		
4 F	IRST YEAR	DULLAR SAVI	NGS 2F3+3A+(3B1d + YEARS	ECONOMIC LIF	Έ)	5 667.69	
5. 1	FITAL NET	DISCUUNTED S	AVINGS (2F5+	30)			5 2,256,70	Ì
ó. L	I I SCUUNTEN	SAVINUS RAT	10 (1F < 1 P	ROJECT DOES H	OT QUALIFY)	(SIR)=(5 +	15) • <u>8.04</u>	

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 			Co	52	£	<u> </u>	He	al	Pu	ing	2(Ry	<u>oa</u>	ic_														
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DRIC D. O. CHONG & ASSOCIATES, INC.
NSULTING MECHANICAL & ELECTRICAL ENGINEERS
30-E North King Street Honolulu, Hawall 96819
Telephone (808) 847-6557
Telefax: (808) 847-6550

DATE:	JOB No.:
PROJECT NAME:	BY:
SUBJECT:	Sht. 4-G0 C

ALL Units Wate Pump	CHANTITY	,									
Lask DESCRIPTION Units Pump	200	٤			ABOR		150	EQUIPMENT	Ì	MATERIAL)
	MO, OF UNITS	UNIT	MH	TOTAL HRS	UNIT	COST	UNIT	COST	UNIT	COST	TOTAL
Pu											
	1	83	3	37.00	118.80	1/8.30			127	127.00	245.80
							·	Subtata			245.80
	:							0/4 (15	(%)		36.87
								Profit	(10%)		28.27
								Tax (4)			12.44
								Bond (19.)		3.23
								•			
								Total			326.60
								Son	₩	330,00	
								· _ (
Themostat	7	£A	1	39.60	0.75	29.70			52	52.00	81.70
								1110	0		6
								3464t	7 7		0/:10
								2/1	(7)		27.7/
								rear	10%		1.40
	-							Read ((6)		7.13
								2			,
								70tal			108.57
								SAY		\$110.00	
-											

TASK DESCRIPTION ALL LILLITS LOMPHISSON LOMPHISSON LEAST LEA	NH S CINIT	5			100	1000	:	1000	
We that the state of the state		_	ABOR		- CO	EQUIPMENT	Ì	MATERIAL	
		TOTAL HRS P	PRICE	COST	PRICE	C03T	PRICE	COST	TOTAL
		3	79.20	237.60			241.00	241.00	478.60
						Subtatu	J		478.60
						OlH (15	7.)		71.79
						Profit (107.)		55.04
				٠	-	Tax (4%			24.22
						Bend (17.)		6.30
			-			•			
					1	Total			635.94
						SAY		\$ 6350	<u>.</u>
				1					
Time Delay Relay 1 EA		1	39.66	39.60			53,00	53.00	92.60
						Subtotal			92.60
						0/H (15	(%		13.89
						Par 1:4 (10%		10.65
						Tax (4	9.)		4.69
						Bond ([%]		1.22
1									
					\	Total			123.04
						SAY	#	125.00	
						1			
Note: Hatural Costs from									
fort ACR, Inc.			•						
2448-148									

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DATE:	JUH NO.:	
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5.	Elect	ricals	ystms				
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5.2	Trai	sformer	- Over	oltage			
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	but	it doe	s not	Cause	increased	ling electrica Denergy w	sage.
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5.3	Tra	nsfirm	er Loa	ding			
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PROJECT NAME:	BY:
SUBJECT:	Sht. 5 -1

6 HVAC System	
6.1 Economizer Cycles (DB)	
	ypes have
Not applicable, none of the unit to central air conditioning systems.	<u>V' </u>
6.2 Radiator Controls	
Not applicables none of the unit. Central heating systems.	hypes have
6.3 FM Controls	
	types have
Not applicable, none of the unit central air conditioning or heating	d'equipment.
6.4 Chiller Replacement	·
Not applicable chillers are not a of the unit type	utilized in any
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6.5 Chiller Controls	· · · · · · · · · · · · · · · · · · ·
Not applicable, chillers are not of the unit types	utilized in one
6.6 Replace Absorption Chiller	
	utilized in one
Not applicable chillers are not of the unit, types.	J

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DATE:	JOB No.	
PROJECT NAME:	<u></u>	BY:
SUBJECT:		Sht. 6-1

6.7	Boiler Oxygen Trim Control (Fixed or Portable)
	Not applicable, boilers are not utilized in any
6.8	Revise Boiler Controls
	Not applicable boilers are not citilized in any of the unit types,
6,9	Return Condensate
	Not applicable, the units do not have central heating systems
6.10	Insulate Steam of Condensale Lines
	Not applicable, the units do not have stam or condensate lines.
Gill	Waste Heat Recovery
	Not applicable, the units do not have central air conditioning systems
6./2	Thermal Storage
	Not applicable the units do not have central cur conditioning systems

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APPENDIX B-1
SUMMARY OF ECO'S

TAN 6-1.1: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 20-11

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	S R
÷	Insu	Insulation					
	1.1	Insulation of Roof, Walls, etc. Insulation of Piping	 0.0038/LF	*0.26/LF	*3.75/LF	14.4	0.81
2.	Exte	Exterior Building Envelope					
	2.1	Weather Stripping & Caulking	:	;	:	:	;
	2.2	Vestibles	:	:	:	i	;
	2.3	Loading Dock Seals	:	:	;	:	:
	5.4	Reduction of Glass Area	:	;	:	:	:
	2.5	Low Emissivity Windows	:	:	:	:	:
	5.6	Water Spray Roof Cooling	:	:	:	:	:
	2.7	Solar Film	:	:	:	:	;
ų.	Lighting	ting					
	3.1	Reduce Lighting Levels	:	i	;	;	į
	3.2	Replace Incadescent Lights	4,403	\$87.72	\$501	5.7	2.04
	3.3	Energy Conserving Fluorescent Light & Ballast	;	;	:	:	į
	3.4	Replace Kitchen Light Fixtures	(Combined w/ 3.3)				
	3.5	Use More Energy Efficient Lighting Source	(Combined w/ 3.2)				
	3.6	Reflectors for Fluorescent Fixtures	į	:	:	:	;
	3.7	Occupancy Sensors to Control Lighting	:	;	:	;	į
	3.8	Separate Switches to Control Lighting	i	;	:	i	;
	3.9	Reduce Street Lighting	:	;	!	!	:
4.	Hot	Hot Water					
	4.1	Control Hot Water Circulation Pump	:	:	;	;	i
	4.2	Heat Reclaim from Family Housing Condenser	:	;	;	i	;
	4.3	Heat Reclaim from Hot Refrigerant Gas	;	:	:	;	į
	4.4	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5	Decentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
	9.4	Install Shower Flow Restrictors/	!	:))))))	:
	4.7	Limited Flow Snowerneads Repair Broken Domestic Hot Water Heat Pumps	40.239	\$801.72	\$270	0.34	9.65

1 Strail Timeclocks 2 Struction Electrical System	And thereing to Hot Water Heater Jify Controls System The Pouer Factor Former Overvoltage Former Loading For Controls For Controls For Replacement For Replacement For Controls For Controls For Controls For Controls For Special Controls For Controls For Special Controls For Special Controls For Special Controls For Special Controls For Special Controls For Special Controls For Special Controls For Special Controls For Special Condensate Lines For Special Con	•						
### Shutdown Energy to Hot Water Heater or Modify Controls Electrical System 5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Loading 4.1 Ecompier Cycles (BB) 6.2 Radiator Controls 6.3 Rediator Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Replace Absorption Chiller 6.6 Replace Absorption Chiller 6.7 Bailer Ovygen Trim Controls 6.8 Revise Boiler Controls 6.9 Insults Steam & Condensate Lines 6.10 Waste Reat Recovery 6.10 Waste Replacement 6.11 Remail Stronge 6.12 Steam Trap Inspection 6.13 Revise or Repair Building MMC Controls 6.14 Right Setskek/Stcup Thermostats 6.15 Infranced Heaters 6.16 Air Curtains 6.17 Revise or Repair Building NMC Controls 6.18 Revise or Repair Building NMC Controls 6.19 Revise or Repair Building NMC Controls 6.10 May Revise or Repair Straitfication 6.11 Revise or Repair Rotting Revise or Repair Rotting 6.12 Revise or Repair Rotting 6.13 Revise or Repair Rotting 6.14 Revise or Repair Rotting 6.15 Revise or Repair Rotting 6.16 High Revise Or Repair Rotting 6.17 Revise Or Repair Rotting 6.18 Revise Or Repair Rotting 6.19 Revise	4.9 Shurdown Energy to Not Water Heater or Modify Controls 5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Loading 6.1 Economizer Cycles (DB) 6.2 Rediator Controls 6.3 Rediator Controls 6.4 Chiller Replacement 6.5 Replace Assorption Childre 6.6 Replace Responsion Childre 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.10 Water Meat Recovery 6.11 Mernal Stones 6.12 Stem Trop Inspection 6.13 Revise to Repair Building HVAC Controls 6.14 Might Stratk-Steut Phermostats 6.15 Infrared Roafers 6.16 Replace Airflowe 6.17 Right Efficiency Motor Replacement 6.18 Reduce Airflowe	8.	Install Timeclocks		;	:	:	1
Electrical System 5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Loading HWAC System 6.1 Economizer Cyrcles (DB) 6.2 Radiator Controls 6.3 Childer Replacement 6.4 Childer Replacement 6.5 Childer Replacement 6.6 Replace Absorption Childer 6.7 Bravise Boiler Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste West Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HWAC Controls 6.14 Might Sethack/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Airflows 6.19 High Efficiency Motor Replacement 6.19 High Efficiency Motor Replacement	Electrical System 5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Downoltage 6.4 Economizer Cycles (DB) 6.5 Radiator Controls 6.6 Replace Absorption Childer 6.7 Childer Replacement 6.8 Replace Absorption Childer 6.9 Insulate Stem & Condensate Lines 6.9 Insulate Stem & Condensate Lines 6.10 Usste Keat Recovery 6.11 Thermal Storage 6.12 Stem Trap Inspection 6.14 Kight Setback/Setup Thermostats 6.15 Kilder Controls 6.16 Mineral Storage 6.17 Prevent Air Stratification 6.18 Reduce Mirfolous 6.19 Reduce Mirfolous 6.19 Reduce Mirfolous 6.19 Reduce Mirfolous 6.19 Reduce Mirfolous	6.7	Shutdown Energy to Hot Water Heater or Modify Controls		:	i	:	;
5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 Chiller Replacement 6.4 Chiller Replacement 6.5 Chiller Replacement 6.6 Replace Absorption Childer 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Hoste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.14 Right Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Prevent Air Stratification 6.19 High Efficiency Motor Replacement 6.19 High Efficiency Motor Replacement	5.1 Improve Power factor 5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Replacement 6.6 Replace Absorption Chiller 6.7 Boiler Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.9 Insulate Steam & Condensate Lines 6.10 Water Heat Recovery 6.11 Hernal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Right Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Infrared Heaters 6.17 Prevent Air Stratification 6.18 Reduce Airflows 6.19 Reduce Airflows 6.19 Reduce Airflows 6.19 Reduce Airflows 6.19 Reduce Airflows 6.19 Reduce Airflows		trical System					
5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 Ha Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.9 Insulate Stema & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Stem Trap Inspection 6.13 Infrared Heaters 6.14 Might Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Airflows 6.18 Reduce Airflows 6.19 Hight Efficiency Motor Replacement	5.2 Transformer Doervoltage 5.3 Transformer Loading 5.4 Transformer Loading 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 Hadie Controls 6.4 Chiller Replacement 6.5 Chiller Controls 6.6 Replace Absorption Chiller 6.7 Boiler Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Jeste Hear Recovery 6.11 Steam Trap Inspection 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Might Setback/Setup Thermostats 6.15 Air Curtains 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Airflows	5.1	Improve Power Factor	ŧ	:	:	;	;
5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.4 Chiller Replacement 6.5 Replace Absorption Chiller 6.6 Replace Absorption Chiller 6.7 Boiler Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Maste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Exem Trap Inspection 6.14 Might Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Revent Air Stratification 6.18 Reduce Air Air Stratification 6.19 Nigh Efficiency Motor Replacement	5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 Radiator Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.6 Replace Absorption Chiller 6.7 Boiler Coxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.9 Insulate Steam & Coxdensate Lines 6.10 Uaste Hear Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise on Repair Building HVAC Controls 6.14 Might Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Airflows 6.19 High Efficiency Motor Replacement	5.2	Transformer Overvoltage	•	:	:	:	:
6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 H Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Replace Absorption Chiller 6.6 Replace Absorption Chiller 6.7 Boiler Controls 6.8 Revise Boiler Controls 6.10 Waste Heat Recovery 6.11 Thermal Storage or Repair Building HVAC Controls 6.12 Them Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Hight Setback/Setup Thermostats 6.15 Infrared Heaters 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Revise or Replacement 6.19 High Efficiency Motor Replacement 6.19 High Efficiency Motor Replacement	6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 H Radio Controls 6.4 Chiller Replacement 6.5 Chiller Controls 6.6 Replace Absorption Chiller 6.7 Boiler Coxtools 6.8 Revies Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Maste Heat Recovery 6.11 Themal Storage 6.12 Steam Trap Inspection 6.14 Riepits or Repair Building HVAC Controls 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Air Replacement 6.19 High Efficiency Hotor Replacement 6.19 High Efficiency Hotor Replacement	5.3	Transformer Loading	;	!	:	:	i
Economizer Cycles (DB) Radistor Controls HA Radio Controls Chiller Replacement Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Boiler Oxygen Trim Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Might Serback/Setup Thermostats Infrared Heaters Freybered Hir Stratification Revise or Replacement Reduce Airflows High Efficiency Motor Replacement Redictions High Efficiency Motor Replacement Redictions High Efficiency Motor Replacement Redictions High Efficiency Motor Replacement High Efficiency Motor Replaceme	Radistor Controls Radistor Controls First Radio Controls First Radio Controls Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Recovery Internal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Air Curtains Air Curtains Air Curtains Reduce Airflows High Efficiency Motor Replacement Figure Controls Figure Airflows Figure Controls Figure Airflows Figure Controls F		System					
Radiator Controls FM Radio Controls Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Controls Insulate Steam & Condensate Lines Vaste Heat Recovery Inhermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Staback/Scup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	Radiator Controls FM Radio Controls Chiller Replacement Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Coxygen Trin Control (Fixed or Portable) Revise Boiler Coxtrols Insulate Steam & Condensate Lines Vaste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	6.1	Economizer Cycles (DB)	:	:	:	:	i
FH Radio Controls Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Controls Insulate Steam & Condensate Lines Waste Heat Recovery Ihermal Storage Revise or Repair Building HVAC Controls High Steack/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows	HA Radio Controls	6.2	Radiator Controls	:	•	:	:	:
Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Ihermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacement High Efficiency Motor Replacem	Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Oxygen Trim Controls Insulate Steam & Condensate Lines Waste Heat Recovery Ihermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infarred Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Wotor Replacement	6.3	FH Radio Controls	•	:	:	:	:
Chiller Controls	Chiller Controls	4.9	Chiller Replacement	1 1	•	•	:	:
Replace Absorption Chiller Boiler Oxygen Trim Control (fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Hermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification High Efficiency Motor Replacement <td>Replace Absorption Chiller </td> <td>6.5</td> <td>Chiller Controls</td> <td>1</td> <td>•</td> <td>:</td> <td>:</td> <td>:</td>	Replace Absorption Chiller	6.5	Chiller Controls	1	•	:	:	:
Boiler Oxygen Trim Control (fixed or Portable)	Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Hermal Storage Steam Trap Inspection Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	9.9	Replace Absorption Chiller	•	•	•	:	:
Revise Boiler Controls -	Insulate Steam & Condensate Lines	2.9	Boiler Oxygen Irim Control (Fixed or Portable)	1	•	:	:	:
Insulate Steam & Condensate Lines	Insulate Steam & Condensate Lines	8.9	Revise Boiler Controls	:	•		:	:
Waste Heat Recovery	Waste Heat Recovery	6.9	Insulate Steam & Condensate Lines	:	:	:	:	:
Thermal Storage -	Thermal Storage	6.10		:	:	:	:	:
Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification High Efficiency Motor Replacement	Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	6.11		:	:	:	:	:
Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	6.12		:	:	:	:	:
Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	6.13		•	•	:	:	:
Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	6.14		1	•	:	:	;
Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	Air Curtains Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	6.15		:	:	•	:	:
Prevent Air Stratification rows Reduce Airflows refliciency Motor Replacement rows rows rows rows rows rows rows rows	Prevent Air Stratification Reduce Airflows High Efficiency Motor Replacement	6.16		:	•	:	:	:
Reduce Airflows High Efficiency Motor Replacement	Reduce Airflows High Efficiency Motor Replacement	6.17		1 1 4 1	* * * * * * * * * * * * * * * * * * * *	:	:	:
High Efficiency Motor Replacement	High Efficiency Motor Replacement	6.18		:	:	•	:	:
		6.19		:	:	•	:	:

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7.1 High Efficiency Motor Replacement

7. Motor/Equipment

TAB 6-1.2: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 20-111

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
- :	Insul	Insulation					
	1.1	Insulation of Roof, Walls, etc. Insulation of Piping	0.0038/LF	*0.26/LF	*3.75/LF	14.4	0.81
۲,	Exter	Exterior Building Envelope					
	2.1	Weather Stripping & Caulking	!	;	:	i	į
	2.2	Vestibles	;	:	:		:
	2.3	Loading Dock Seals	:	;	:	!	!
	5.4	Reduction of Glass Area	:	:	:	;	:
	2.5	Low Emissivity Windows		:	•	:	:
	5.6	Water Spray Roof Cooling	:	:	:	:	:
	2.7	Solar Film	:	:	:	;	:
ë.	Lighting	ting					
	3.1	Reduce Lighting Levels	:	:	;	į	į
	3.2	Replace Incadescent Lights	4.820	\$95.95	\$563.50	5.9	1.99
	3.3	Energy Conserving Fluorescent Light & Ballast	:	:	•	:	:
	3.4	Replace Kitchen Light Fixtures	(Combined W/ 3.3)				
	3.5	Use More Energy Efficient Lighting Source	(Combined w/ 3.2)				
	3.6	Reflectors for Fluorescent Fixtures	:	:	:	:	:
	3.7	Occupancy Sensors to Control Lighting	i	:	:	:	:
	3.8	Separate Switches to Control Lighting	:	:	:	;	:
	3.9	Reduce Street Lighting	:	!	:	!	:
	Hot Water	Jater					
	4.1	Control Hot Water Circulation Pump	į	į	:	į	į
	4.2	Heat Reclaim from Family Housing Condenser	:	:	:	:	:
	4.3	Heat Reclaim from Hot Refrigerant Gas	!	:	:	:	;
	4.4	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5	Decentralize Domestic Hot Water Heaters	(Combined W/ 4.3)				
	9.4	Install Shower Flow Restrictors/	:	i	:	:	:
	4.7	Limited Flow Showerheads Repair Broken Domestic Hot Water Heat Pumps	26.79	\$533.66	\$270	0.51	6.42

	4						, 1
	8.	Install Timeclocks	:	:	:	:	:
,	6.9	Shutdown Energy to Hot Water Heater or Modify Controls	:	:	į	:	:
۶.	Elect	Electrical System					
	5.1	Improve Power Factor	:	:	•	:	į
	5.5	Transformer Overvoltage	:	:	:	:	;
	5.3	Transformer Loading	:	:	:	:	:
٠,	HVAC	HVAC System					
	6.1	Economizer Cycles (DB)	:	;	;	;	:
	6.2	Radiator Controls	:	:	:	:	:
	6.3	fM Radio Controls	:	•	:	:	:
	7.9	Chiller Replacement	:	:	:	:	:
	6.5	Chiller Controls	•	:	:	:	:
	9.9	Replace Absorption Chiller	:	:	:	:	:
	6.7	Boiler Oxygen Trim Control (Fixed or Portable)	:	:	:	:	:
	8.9	Revise Boiler Controls	:	:	:	:	:
	6.9	Insulate Steam & Condensate Lines	:	:	:	:	:
	6.10	Waste Heat Recovery	:	:	:	:	i
	6.11	Thermal Storage	:	:	:	:	į
	6.12	Steam Irap Inspection	:	:	:	:	į
	6.13	Revise or Repair Building HVAC Controls	:	:	:	:	:
	6.14	Wight Setback/Setup Thermostats	;	:	:	:	:
	6.15	Infrared Heaters	:	:	:	:	į
	6.16	Air Curtains	•	:	:	•	:
	6.17	Prevent Air Stratification	:	:	•	•	:
	6.18	Reduce Airflows	:	:	:	:	:
	6.19	High Efficiency Motor Replacement	:	:	:	:	:
7		Hotor/Equipment					
	7.1	High Efficiency Motor Replacement	:	i	;	;	:

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
:	Insu	Insulation					
	1.1	Insulation of Roof, Walls, etc. Insulation of Piping	 0.0038/LF	*0.26/LF	*3.75/LF	14.4	0.81
2:	Exte	Exterior Building Envelope					
	2.1	Weather Stripping & Caulking	;	į	:	į	į
	2.2	Vestibles		:	;	:	;
	2.3	Loading Dock Seals	:	:	:	:	:
	2.4	Reduction of Glass Area	:	!	:	:	1
	2.5	LOW Emissivity Windows	:	:	!	•	:
	5.6	Water Spray Roof Cooling	:	:	:	;	:
	2.7	Solar Film	i	:	:	:	!
ĸ.	Lighting	ting					
	3.1	Reduce Lighting Levels	:	:	:	į	;
	3.5	Replace Incadescent Lights	9.000	\$119.61	\$623	5.2	2.24
	3.3	Energy Conserving Fluorescent Light & Ballast	0.403	\$ 8.02	\$600.00	74.8	0.16
	3.4	Replace Kitchen Light Fixtures	(Combined w/ 3.3)				
	3.5	Use More Energy Efficient Lighting Source	(Combined W/ 3.2)				
	3.6	Reflectors for Fluorescent Fixtures	:	:	:	;	<u>:</u>
	3.7	Occupancy Sensors to Control Lighting	i	!	:	:	;
	3.8	Separate Switches to Control Lighting	:	:	;	;	:
	3.9	Reduce Street Lighting	:	:	:	!	:
4	Hot	Hot Water					
	4.1	Control Hot Water Circulation Pump	;	. !	:	į	;
	4.2	Heat Reclaim from Family Housing Condenser	:	i	:	;	;
	4.3	Heat Reclaim from Hot Refrigerant Gas	:	:	•	:	:
	4.4	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5	Decentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
	9.4	Install Shower Flow Restrictors/	•	:	:	:	•
	4.7	Limited Flow Showerheads Repair Broken Domestic Hot Water Heat Pumps	40.239	\$801.72	\$270	0.34	9.65

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	8	Install Timeclocks	:		•	•	1
	6.9	Shutdown Energy to Hot Water Heater or Modify Costolis	:	:	:	:	:
ν.	Elect	Electrical System					
	5.1	Improve Power Factor		:	:	;	•
	5.2	Transformer Overvoltage	:	•		•	:
	5.3	Transformer Loading	}	•	•	:	:
•		HVAC System					
	6.1	Economizer Cycles (DB)	į	•	:	;	;
	6.2	Radiator Controls	:	•	:	:	:
	6.3	FM Radio Controls	:	•	:	:	:
	4.9	Chiller Replacement	:	:	•	:	:
	6.5	Chiller Controls	:	:	•	:	:
	9.9	Replace Absorption Chiller	:	•	•	:	:
	6.7	Boiler Oxygen Trim Control (Fixed or Portable)	:	:	:	:	:
	8.9	Revise Boiler Controls	:	:	:	:	:
	6.9	Insulate Steam & Condensate Lines	:	•	•	:	:
	6.10	Waste Heat Recovery	:	:	:	:	:
	6.11	Thermal Storage	;	:		:	;
	6.12	Steam Trap Inspection	:	•		:	:
	6.13	Revise or Repair Building HVAC Controls	:		:	:	:
	6.14		:	•	:	:	i
	6.15	Infrared Heaters	:	;	•	:	:
	6.16	Air Curtains	į	:	:	:	:
	6.17	Prevent Air Stratification	:	:	:	•	:
	6.18	Reduce Airflows	:	:	•	:	:
	6.19	High Efficiency Motor Replacement	:	:	•	* * * * * * * * * * * * * * * * * * * *	:
7.		Motor/Equipment					
	7.1	High Efficiency Motor Replacement	į	:	;	:	i

TAB 5-1.4: ENERGY CONSERVATION OPPORTUNITIES FOR UMIT TYPE 20-V

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	⊘∜MPLE PAYBACK YEARS	SIR
-:	Insul	Insulation					
	1.1	Insulation of Roof, Walls, etc. Insulation of Piping	0.0038/LF	*0.26/LF	*3.75/LF	14.4	0.81
۶.	Exter	Exterior Building Envelope					
	2.1	Weather Stripping & Caulking	i	:	;	į	:
	2.3	vestibles Loading Dock Seals	: :		! ! ! !		
	5.4	Reduction of Glass Area	;	:	;	;	;
	2.5	Low Emissivity Windows	;	;	;	:	:
	5.6	Water Spray Roof Cooling	:	:	;	:	;
	2.7	Solar Film	:	•	:	:	
m.	Lighting	ring					
	3.1	Reduce Lighting Levels	į	;	;	;	:
	3.2	Replace Incadescent Lights	4.287	\$85.08	\$476.00	5.6	2.08
	3.3	Energy Conserving Fluorescent Light & Ballast	0.403	\$ 8.02	00.009\$	74.8	0.16
	3.4 7.4	Replace Kitchen Light Fixtures	(Combined w/ 3.3)				
	3.6	Reflectors for Fluorescent Fixtures		:	:	!	;
	3.7	Occupancy Sensors to Control Lighting	:	:	:	;	į
	3.8	Separate Switches to Control Lighting	:	:	•	;	:
	3.9	Reduce Street Lighting	!	:	1 1 1	:	:
	Hot Water	Jater					
	1.4	Control Hot Water Circulation Pump	;	;	!	:	į
	4.2	Heat Reclaim from Family Housing Condenser	:	:	:	:	:
	4.3	Heat Reclaim from Hot Refrigerant Gas	1 1 2	:	:	:	:
	4.4	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5	Decentralize Domestic Hot Water Heaters	(Combined W/ 4.3)				
	9.4	Install Shower Flow Restrictors/	:	:	:	:	:
	4.7	Limited Flow Snowerheads Repair Broken Domestic Hot Water Heat Pumps	20.058	\$399.63	\$270	0.68	4.81

-1.5: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 32-1 & 32-11

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
÷	Insul	Insulation					
	1.1	Insulation of Roof, Walls, etc. Insulation of Piping	0.0038/LF	*0.26/LF	*3.75/LF	14.4	0.81
2.	Exter	Exterior Building Envelope				·	
	2.1	Weather Stripping & Caulking	;	:	1 1	;	;
	2.2	Vestibles	:	:	į	:	•
	2.3	Loading Dock Seals	:	:	i	•	•
	5.4	Reduction of Glass Area	:	:	:	:	-
	2.5	Low Emissivity Windows	1 1		:	:	:
	5.6	Water Spray Roof Cooling	:	1 1 1 1	;	:	:
	2.7	Solar Film	•	:	:	:	:
ĸ.	Lighting	ting			-		
	3.1	Reduce Lighting Levels	:	:	:	;	:
	3.2	Replace Incadescent Lights	0.235	\$ 4.69	\$ 25.90	5.5	2.11
	3.3	Energy Conserving Fluorescent Light & Ballast	1.010	\$20.13	\$1800.00	89.4	0.13
	3.4	Replace Kitchen Light Fixtures	(Combined w/ 3.3)				
	3.5	Use More Energy Efficient Lighting Source	(Combined w/ 3.2)				
	3.6	Reflectors for Fluorescent Fixtures	:		:	:	:
	3.7	Occupancy Sensors to Control Lighting	:	1 1 1	:	:	;
	3.8	Separate Switches to Control Lighting	:	:	:	•	
	3.9	Reduce Street Lighting	:	:	8 8 1	!	!
4.	Hot Water	Jater					
	4.1	Control Hot Water Circulation Pump	;	i	1	i	;
	4.2	Heat Reclaim from Family Housing Condenser	:	•	;	:	;
	4.3	Heat Reclaim from Hot Refrigerant Gas	•	:	:	:	:
	4.4	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5	Decentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
	9.4	Install Shower Flow Restrictors/	1 1 0	!	:	:	:
	4.7	Limited Flow Showerheads Repair Broken Domestic Hot Water Heat Pumps	20.058	\$399.63	\$270	0.68	4.81

Electrical System 5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FK Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Trim Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification	system ve Power Factor former Loading ve Power Factor former Loading inizer Cycles (DB) for Controls for Controls for Controls for Controls for Controls for Controls for Controls for Controls for Controls for Controls for Controls for Controls for Controls for Absorption Chiller for Absorption Chil
Electrical System 5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Iransformer Loading 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FM Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Routrols 6.6 Replace Absorption Chiller 6.7 Boiler Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Hight Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification	Electrical System 5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FM Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Controls 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Airflows
5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Routrols 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Irim Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification	5.1 Improve Power Factor 5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FM Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Replace Absorption Chiller 6.7 Boiler Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Might Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Airflows
5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Controls 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification	5.2 Transformer Overvoltage 5.3 Transformer Loading HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FM Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Controls 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Airflows
HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FM Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Controls 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.17 Prevent Air Stratification 6.18 Prevent Air Stratification 6.19 Prevent Air Stratification 6.10 Prevent Air Stratification 6.11 Prevent Air Stratification 6.12 Prevent Air Stratification 6.13 Prevent Air Stratification 6.14 Prevent Air Stratification 6.15 Prevent Air Stratification 6.16 Prevent Air Stratification 6.17 Prevent Air Stratification 6.18 Prevent Air Stratification 6.19 Prevent Air Stratification 6.10 Prevent Air Stratification 6.11 Prevent Air Stratification 6.12 Prevent Air Stratification 6.13 Prevent Air Stratification 6.14 Prevent Air Stratification 6.15 Prevent Air Stratification 6.16 Prevent Air Stratification 6.17 Prevent Air Stratification 6.18 Prevent Air Stratification 6.19 Prevent Air Stratification 6.10 Prevent Air Stratification	HVAC System 6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FM Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Chiller Controls 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Airflows 6.18 Reduce Airflows
6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FM Radio Controls 6.4 Chiller Replacement 6.5 Chiller Replacement 6.5 Replace Absorption Chiller 6.7 Roiler Controls 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification	6.1 Economizer Cycles (DB) 6.2 Radiator Controls 6.3 FM Radio Controls 6.4 Chiller Replacement 6.5 Chiller Controls 6.6 Replace Absorption Chiller 6.7 Boiler Oxygen Trim Control (Fixed or Portable) 6.8 Revise Boiler Controls 6.9 Insulate Steam & Condensate Lines 6.10 Waste Heat Recovery 6.11 Thermal Storage 6.12 Steam Trap Inspection 6.13 Revise or Repair Building HVAC Controls 6.14 Night Setback/Setup Thermostats 6.15 Infrared Heaters 6.16 Air Curtains 6.17 Prevent Air Stratification 6.18 Reduce Airflows
Economizer Cycles (DB) Radiator Controls FM Radio Controls Chiller Replacement Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification	Economizer Cycles (DB) Radiator Controls FM Radio Controls FM Radio Controls Chiller Replacement Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Radiator Controls FM Radio Controls Chiller Replacement Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification	Radiator Controls FM Radio Controls Chiller Replacement Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
FM Radio Controls Chiller Replacement Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification	FM Radio Controls Chiller Replacement Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification	Chiller Replacement Chiller Controls Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification	Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Reduce Airflows
Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification	Replace Absorption Chiller Boiler Oxygen Trim Control (Fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Reduce Airflows
Boiler Oxygen Trim Control (fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification	Boiler Oxygen Trim Control (fixed or Portable) Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification	Revise Boiler Controls Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification	Insulate Steam & Condensate Lines Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification	Waste Heat Recovery Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification	Thermal Storage Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification	Steam Trap Inspection Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification	Revise or Repair Building HVAC Controls Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification	Night Setback/Setup Thermostats Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Infrared Heaters Air Curtains Prevent Air Stratification	Infrared Heaters Air Curtains Prevent Air Stratification Reduce Airflows
Air Curtains Prevent Air Stratification	Air Curtains Prevent Air Stratification Reduce Airflows
Prevent Air Stratification	Prevent Air Stratification Reduce Airflows
	Reduce Airflows

TAMES -1.6: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 32-111

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
÷	Insulation					
- -	1.1 Insulation of Roof, Walls, etc. 1.2 Insulation of Piping	0.0038/LF	\$0.26/LF	**************************************	14.4	0.81
2.	Exterior Building Envelope					
14	2.1 Weather Stripping & Caulking	;	:	•	:	:
	2.2 Vestibles	•	•	:	:	;
"	2.3 Loading Dock Seals	:	;	•	:	:
17	2.4 Reduction of Glass Area	:	:	:	:	;
• • •		: :	:	:	:	i
(7		•	:	:	:	:
.~	2.7 Solar Film	•	!	:	:	:
ж. 1	Lighting					
(۳	3.1 Reduce Lighting Levels	;	i	;	i	•
41	3.2 Replace Incadescent Lights	5.672	\$113.00	\$700.00	6.2	1.88
۲٦	3.3 Energy Conserving Fluorescent Light & Ballast	:	:	:		:
r1		(Combined W/ 3.3)				
r1	3.5 Use More Energy Efficient Lighting Source	(Combined w/ 3.2)				
r!	3.6 Reflectors for Fluorescent Fixtures	i	:	;	:	:
r1		:	:	:	:	:
r!		:	:	i	:	į
~,	3.9 Reduce Street Lighting	:	:	:	į	į
. .	Hot Water					
4	4.1 Control Hot Water Circulation Pump	;	:	:	:	:
4	4.2 Heat Reclaim from Family Housing Condenser	f .	:	:	:	;
4	4.3 Heat Reclaim from Hot Refrigerant Gas	:	:	:	:	;
4	4.4 Instantaneous Not Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
4	4.5 Decentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
7	4.6 Install Shower Flow Restrictors/	:	:	:	:	:
`			,,	9	(
•	4./ Kepair Broken Domestic Not Water Heat Pumps	, 8cu.us	\$599.63	22/0	99.0	4. 81

B 1969 Times Times			•		
)		1	• • •	i
4.9 Shutdown Energy to Hot Water Heater	:	:	:	i	:
or Modify Controls					
Electrical System					
5.1 Improve Power Factor	:	:	;	;	:
	:	:	:		:
	:	:	;	i	•
HVAC System					
6.1 Economizer Cycles (DB)	:	•	;	:	
6.2 Radiator Controls	:	:	:	:	•
6.3 FM Radio Controls	:	:	:	:	:
6.4 Chiller Replacement	:	•	•	:	:
6.5 Chiller Controls	:	:	:	:	:
6.6 Replace Absorption Chiller	:	:	:	:	:
6.7 Boiler Oxygen Irim Control (Fixed or Portable)	•	:	:	:	:
6.8 Revise Boiler Controls	:	:	:	:	:
6.9 Insulate Steam & Condensate Lines	:	•	•	:	-
6.10 Waste Heat Recovery	:		•	:	-
6.11 Thermal Storage	:	:		:	-
6.12 Steam Trap Inspection	:	:	:	:	
6.13 Revise or Repair Building HVAC Controls	:	•	•	:	i
6.14 Night Setback/Setup Thermostats	:	•	:	•	:
6.15 Infrared Heaters	:	•	:	:	:
6.16 Air Curtains	:	•	:	:	;
6.17 Prevent Air Stratification	:	:	:	i	;
6.18 Reduce Airflows	:	:	:	:	:
6.19 High Efficiency Motor Replacement	;	:	:	;	:
Kotor/Equipment					
7.1 High Efficiency Motor Replacement	:	;	i	į	:

TALLE 8-1.7: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 32-1V

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
- :	Insc	Insulation					
	1.1	insulation of Roof, Walls, etc. Insulation of Piping	0.0038/LF	\$0.26/LF	**************************************	14.4	0.81
۶.	Exte	Exterior Building Envelope					
	2.1	Weather Stripping & Caulking	:	}	:	į	i
	2.2		:	:	:	:	:
	2.3	Loading Dock Seals	:	:	:	;	!
	2.4	Reduction of Glass Area	:	:	:	:	:
	2.5	Low Emissivity Windows	:	:	:	:	:
	5.6	Water Spray Roof Cooling	:	:	:	:	:
	2.7	Solar Film	:	:	!	:	:
m,	Ligh	Lighting					
	3.1	Reduce Lighting Levels	;	;	:	į	:
	3.2	Replace Incadescent Lights	5.041	\$100.44	\$661.50	9.9	1.77
	3.3	Energy Conserving Fluorescent Light & Ballast	0.109	\$ 2.18	\$280.00	128.4	0.09
	3.4	Replace Kitchen Light Fixtures	(Combined w/ 3.3)				
	3.5	Use More Energy Efficient Lighting Source	(Combined W/ 3.2)				
	3.6	Reflectors for Fluorescent Fixtures	:	:	:	:	:
	3.7	Occupancy Sensors to Control Lighting	:	:	;	;	:
	3.8	Separate Switches to Control Lighting	:		:	:	:
	3.9	Reduce Street Lighting	:	:	:	:	:
4.	Hot	Hot Water					
	4.1	Control Hot Water Circulation Pump	i	:	:	i	į
	4.2	Heat Reclaim from Family Housing Condenser	:	:	:	:	;
	4.3	Heat Reclaim from Hot Refrigerant Gas	•	:	•	:	;
	4.4		5.810	\$38.56	\$1424	36.9	0.11
	4.5		(Combined w/ 4.3)				
	4.6	Install Shower Flow Restrictors/	:	1 1 1	:	:	:
	4.7	Limited Flow Showerheads Repair Broken Domestic Hot Water Heat Pumps	33.512	\$667.69	\$270	0.40	8.04

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8			Electr	5.1	5.5	5.3	HVAC System	6.1	2.9	6.3	4.9	6.5	9.9	2.9	8.9	6.9	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.17	6.18	6.19	fotor/	7.1
Install Timeclocks	Shutdown Energy to Hot Water Heater	or Modify Controls	Electrical System	Improve Power Factor	Transformer Overvoltage	Transformer Loading	ystem	Economizer Cycles (DB)	Radiator Controls	FM Radio Controls	Chiller Replacement	Chiller Controls	Replace Absorption Chiller	Boiler Oxygen Irim Control (Fixed or Portable)	Revise Boiler Controls	Insulate Steam & Condensate Lines	Waste Heat Recovery	Thermal Storage	Steam Trap Inspection	Revise or Repair Building HVAC Controls	Night Setback/Setup Thermostats	Infrared Heaters	Air Curtains	Prevent Air Stratification	Reduce Airflows	High Efficiency Motor Replacement	Motor/Equipment	High Efficiency Motor Replacement
	:			:	:	:		:	:	:	;	:	:	i	:	i	:	:	:	:	:	:	:	:	:	:		:
:	:			:	:	:		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		į
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TAS 8-1.8: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 57-1

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
. :	Insulation					
	1.1 Insulation of Roof, Walls, etc. 1.2 Insulation of Piping	0.0038/LF	\$0.26/LF	 \$3.75/LF	14.4	0.81
%	Exterior Building Envelope					
	2.1 Weather Stripping & Caulking	;	!	-	į	i
	2.2 Vestibles	!	:	•	:	•
		:	:	:	:	
		:	:	:	:	;
		:	:	•	:	:
		:	:	:	:	:
	2.7 Solar Film		!!!!	:	:	:
m	Lighting					
	3.1 Reduce Lighting Levels	:	;	:	!	:
	3.2 Replace Incadescent Lights	4.212	\$83.91	\$451.50	5.4	2.17
	3.3 Energy Conserving Fluorescent Light & Ballast	i	:	:	:	:
		(Combined w/ 3.4)				
		(Combined W/ 3.2)				
		:	:	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	•	:
		:	;	:	:	:
		:	:	:	:	:
	3.9 Reduce Street Lighting	:	:	:	:	:
4	Hot Water					
	4.1 Control Hot Water Circulation Pump	!	i	;	;	;
	4.2 Heat Reclaim from Family Housing Condenser	:	:	•	:	:
	4.3 Heat Reclaim from Hot Refrigerant Gas	:	:	:	:	:
	4.4 Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5 Decentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
	4.6 Install Shower Flow Restrictors/	:	:	•	:	i
	Limited Flow Showerheads 4.7 Repair Broken Domestic Hot Water Heat Pumps	13.331	\$265.61	\$270	1.0	3.20



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8. 6.4			: :	<u> </u>	! !)
1	or Modify Controls					
בוני	וויכפו פלטינייי					
5.1	Improve Power Factor	:	:	:	:	:
2.5	Transformer Overvoltage	:	;	:	•	:
5.3	Transformer Loading	:	•	•	:	:
HVAC	HVAC System					
6.1	Economizer Cycles (DB)	:	:	į	:	į
. 6.2	Radiator Controls	:	:	:	:	:
6.3	FM Radio Controls	;	:	:	:	:
4.9	Chiller Replacement	:	•	:	:	:
6.5	Chiller Controls	:	:	:		•
9.9	Replace Absorption Chiller	:	:	:	•	:
4.7	Boiler Oxygen Irim Control (Fixed or Portable)	:	:	:	:	:
6.8	Revise Boiler Controls	:	:	:	:	i
6.9	Insulate Steam & Condensate Lines	•	:	:	:	:
6.10	Vaste Heat Recovery	•	:	:	:	;
6.11	Thermal Storage	:	:	•	:	i

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lotor/Equipment	High Efficiency Motor Replacement
Motor	7.1
7	

High Efficiency Motor Replacement

Prevent Air Stratification

6.17

6.18 Reduce Airflows

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:

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6.13 Revise or Repair Building HVAC Controls

6.12 Steam Trap Inspection

Night Setback/Setup Thermostats

6.14 6.15

Infrared Reaters

6.16 Air Curtains

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TABLE 8-1.9: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 57-11, 57-1V, 57-VI, 57-VIII, & 57-IX

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
1. Inst	Insulation					
1.1	Insulation of Roof, Walls, etc. Insulation of Piping	0.0038/LF	*0.26/LF	**************************************	14.4	0.81
2. Exto	Exterior Building Envelope					
2.1	Weather Stripping & Caulking	;	i	:	į	į
2.2	Vestibles	:	:	:	:	:
2.3	Loading Dock Seals	•	`:	:	:	:
5.4		:	:	:	:	:
2.5	Low Emissivity Windows	:	:	;	:	:
2.6		:	:	:	i	:
2.7	Solar Film	:	:	i	i	:
3. Ligh	Lighting					
3.1	Reduce Lighting Levels	:	:	:	:	:
3.2		1.935	\$38.56	\$259.00	6.7	1.73
3.3	Energy Conserving Fluorescent Light & Ballast	•	:	:	:	:
3.4	Replace Kitchen Light Fixtures	(Combined W/ 3.3)				
3.5		(Combined w/ 3.2)				
3.6	Reflectors for Fluorescent Fixtures	:	:	:	:	:
3.7	Occupancy Sensors to Control L	:	:	i	:	:
3.8	Separate Switches to Control Lighting	:	:	:	:	:
3.9	Reduce Street Lighting	:	:	!	# # #	:
4. Not	Not Water	s				
4.1	Control Hot Water Circulation Pump	1	i	:	į	į
4.2		:	:	:	i	i
4.3	Heat Reclaim from Hot Refrigerant Gas	*	:		:	į
4.4		5.810	\$38.56	\$1424	36.9	0.11
4.5	1 10 10 10	(Combined w/ 4.3)				
4.6		:	:	:	•	:
4.7	Limited Flow Showerheads Repair Broken Domestic Hot Water Heat Pumps	26.785	\$533.63	\$270	0.51	6.43

	.8 Install Timeclocks		:	:	:	
	4.9 Shutdown Energy to Hot Water Heater	:	:	:	:	:
	or Modify Controls					
κ.	Electrical System					
	5.1 Improve Power Factor	:	:	i	;	:
	5.2 Transformer Overvoltage	:	1	:	;	:
	5.3 Transformer Loading	:	* * * * * * * * * * * * * * * * * * * *	:	!	1 1 1
•	HVAC System					
	6.1 Economizer Cycles (DB)	;	:	;	:	;
	6.2 Radiator Controls	:	:	:	•	•
	6.3 FM Radio Controls	;	:	:	:	:
	6.4 Chiller Replacement	:		:	:	:
	6.5 Chiller Controls	!	:	:	:	:
	6.6 Replace Absorption Chiller	;	:	:	:	:
	6.7 Boiler Oxygen Irim Control (Fixed or Portable)	:	:	:	i	i
	6.8 Revise Boiler Controls	:	:	:	:	:
	6.9 Insulate Steam & Condensate Lines		:	:	i	i
	6.10 Waste Heat Recovery	į	:	:	:	:
	6.11 Thermal Storage	:	:	:	:	i
	6.12 Steam Trap Inspection	:	•	:	:	:
	6.13 Revise or Repair Building HVAC Controls	;	:	:	:	į
	6.14 Night Setback/Setup Thermostats	;	:	:	i	:
	6.15 Infrared Heaters	:	:	:	i	i
	6.16 Air Curtains	:	:	:	:	:
	6.17 Prevent Air Stratification	. :	:		:	:
	6.18 Reduce Airflows	:	:		:	:
•	6.19 High Efficiency Motor Replacement	:	:	:	:	:
7.	Hotor/Equipment					
	7.1 High Efficiency Hotor Replacement		;	:	i	:
				•		

TABLE 8-1.10: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 57-111

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
-:	Insul	Insulation	\$				
	1.1	Insulation of Roof, Walls, etc. Insulation of Piping	0.0038/LF	\$0.26/LF	**************************************	14.4	0.81
	Exter	Exterior Building Envelope					
	2.1	Weather Stripping & Caulking	i	i	•	i	i
	2.2	Vestibles	•	:	;	:	•
	2.3	Loading Dock Seals	•	:	:	:	;
	2.4	Reduction of Glass Area	:	:	!	:	į
	2.5	Low Emissivity Windows	:	:	:	:	:
	5.6	Water Spray Roof Cooling	:	:	:	:	:
	2.7	Solar Film	:	:	:	:	:
m.	Lighting	ting					
	3.1	Reduce Lighting Levels	:	:	:	į	į
	3.2	Replace Incadescent Lights	1.621	\$32.30	\$182.00	5.6	2.06
	3.3	Energy Conserving Fluorescent Light & Ballast	0.239	\$ 4.76	\$610.00	128.2	0.0
	3.4	Replace Kitchen Light Fixtures	(Combined W/ 3.3)				
	3.5	Use More Energy Efficient Lighting Source	(Combined W/ 3.2)				
	3.6	Reflectors for Fluorescent Fixtures	:	:	:	:	:
	3.7	Occupancy Sensors to Control Lighting	:	:	:	:	:
	3.8	Separate Switches to Control Lighting	:	:	•	:	:
	3.9	Reduce Street Lighting		:	:	:	:
4	Hot Water	Jater					
	4.1	Control Hot Water Circulation Pump	1	!		-	i
	4.2	Heat Reclaim from Family Housing Condenser	:	i	:	:	į
	4.3	Heat Reclaim from Hot Refrigerant Gas	•	:	i	:	;
	4.4	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5	Decentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
	9.4	Install Shower Flow Restrictors/	:	;	:	:	:
	4.7	Repair Broken Domestic Hot Water Heat Pumps	26.785	\$533.63	\$270	0.51	6.43

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ļ	8.	Install Timeclocks		:	:	:	:
	6.4	Shutdown Energy to Hot Water Heater or Modify Controls	<u>:</u>	i	<u>.</u>	:	:
۸.		Electrical System					
	5.1	Improve Power Factor	i	į	:	:	•
	5.2	Transformer Overvoltage	:	:	:	:	:
	5.3	Transformer Loading	:	:	;	i	:
6.		HVAC System					
	6.1	Economizer Cycles (DB)	;	į	:	:	
	6.2	Radiator Controls	:	:	:	:	:
	6.3	FM Radio Controls	:	:	:	;	:
	4.9	Chiller Replacement	:	:	:	;	:
	6.5	Chiller Controls	:	:	:	:	:
	9.9	Replace Absorption Chiller	:	:	:	:	:
	6.7	Boiler Oxygen Trim Control (Fixed or Portable)	:	:	. !	:	:
	6.8	Revise Boiler Controls	:	:	:	:	:
	6.9	Insulate Steam & Condensate Lines	:	:	•	:	:
	6.10	Waste Heat Recovery	:	:	:	:	:
	6.11	Thermal Storage	:	:	•	:	•
	6.12	Steam Trap Inspection	:	:	:	:	:
	6.13	i Revise or Repair Building HVAC Controls	:	:	:	:	:
	6.14		:	:	:	:	:
	6.15	Infrared Heaters	:	:	:	:	:
	6.16	5 Air Curtains	:	•	:	:	:
	6.17	Prevent Air Stratification	:	:	:	:	:
	6.18	Reduce Airflows	:	:	;	;	:
	6.19	' High Efficiency Motor Replacement	:	:	:	:	:
7.		Notor/Equipment					
	7.1	High Efficiency Motor Replacement	:	:	;	:	

TABLE 8-1.11: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 57-V & 57-VIT

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
. :	Insu	Insulation					
	1.1	Insulation of Roof, Walls, etc. Insulation of Piping	0.0038/LF	*0.26/LF	*3.75/LF	14.4	0.81
5.	Exter	Exterior Building Envelope					
	2.1	Weather Stripping & Caulking	;	į	į	į	;
	2.2	Vestibles	:	:	:	:	:
	2.3	Loading Dock Seals	:	•	;	:	:
	2.4	Reduction of Glass Area	: :	: ;	: :	: :	1 1
	5.6	Water Spray Roof Cooling	i	:	:	;	:
	2.7	Solar Film	! ! !	; ;	:	1	i
ĸ.	Lighting	ting					
	3.1	Reduce Lighting Levels	;	:	:	;	į
	3.2	Replace Incadescent Lights	1.464	\$29.17	\$154.00	5.3	2.20
	3.3	Energy Conserving Fluorescent Light & Ballast	0.239	\$ 4.76	\$610.00	128.2	0.09
	3.5	Replace Kitchen Light Fixtures Use More Energy Efficient Lighting Source	(Combined W/ 3.3)				
	3.6	Reflectors for Fluorescent Fixtures		1 1 1	:	:	1 1
	3.7	Occupancy Sensors to Control Lighting	:	;	:	;	;
	3.8	Separate Switches to Control Lighting	:	;	:	;	:
	3.9	Reduce Street Lighting	:	:	:	0 0 0	;
*	Hot 1	Hot Water					
	4.1	Control Hot Water Circulation Pump	;	1 9 1 3	;	: :	;
	4.2	Heat Reclaim from Family Housing Condenser	i	:	;	;	:
	4.3	Meat Reclaim from Hot Refrigerant Gas	:	:	:	:	;
	4.4	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5	Decentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
	9.4	Install Shower Flow Restrictors/	:	1 2 2	:	:	;
	4.7	Limited riow Snowerneads Repair Broken Domestic Hot Water Heat Pumps	20.058	\$399.64	\$270	0.68	4.81

						2
8.	Install Timeclocks		:	:	:	
6.9	Shutdown Energy to Hot Water Keater	:	:	:	:	:
	or Modify Controls					
5. Elec	Electrical System					
5.1	Improve Power Factor	:	:		!	;
5.5	Transformer Overvoltage	:	,	:	:	:
5.3	Transformer Loading	:	:	:	i	
6. HVAC	HVAC System					
6.1	Economizer Cycles (DB)	;	;	;	;	;
6.2	Radiator Controls	•	:		:	•
6.3	fH Radio Controls	•	:	:	:	:
7.9	Chiller Replacement	;	;	:	:	:
6.5	Chiller Controls	:	:	:	:	:
9.9	Replace Absorption Chiller	:	:	:	•	:
6.7	Boiler Oxygen Trim Control (Fixed or Portable)	:	:	:	:	:
6.8	Revise Boiler Controls	:	:	:	i	:
6.9	Insulate Steam & Condensate Lines	i	:	:	:	:
6.10	Waste Heat Recovery	:	:	:	i	:
6.11	Thermal Storage	:	:	:	:	:
6.12	Steam Trap Inspection	:	:	:	•	•
6.13	Revise or Repair Building HVAC Controls	:	:	:	:	:
6.14	Night Setback/Setup Thermostats	:	:	•	* * *	:
6.15	Infrared Heaters	:	:	•	:	:
6.16	Air Curtains	:	:	:	:	:
6.17	Prevent Air Stratification	:	:	:	•	:
6.18	Reduce Airflows	:	•	•	:	:
6.19	High Efficiency Motor Replacement		:	:	i	:
7. Hotor	Motor/Equipment					
7.1	High Efficiency Motor Replacement	:	i	;	:	:

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TABLE 8-1.12: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 60-1

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
-:	Insulation					
	 Insulation of Roof, Walls, etc. Insulation of Piping 	 0.0038/LF	*0.26/LF	*3.75/LF	14.4	0.81
2.	Exterior Building Envelope					
	2.1 Weather Stripping & Caulking	į	i	:	i	:
	2.2 Vestibles	:	1 1	:	:	:
	2.3 Loading Dock Seals	:	:	:	:	:
	2.4 Reduction of Glass Area	:	:	:	:	
	2.5 Low Emissivity Windows	:	:	1	;	:
		:	:	:	:	:
	2.7 Solar Film	1	:	:	:	:
ĸ.	Lighting					
	3.1 Reduce Lighting Levels	:	i	:	;	:
	3.2 Replace Incadescent Lights	0.235	\$4.69	\$ 25.90	5.5	2.11
	3.3 Energy Conserving Fluorescent Light & Ballast	0.259	\$5.17	\$610.00	130.0	0.0
	3.4 Replace Kitchen Light Fixtures	(Combined w/ 3.3)				
	3.5 Use More Energy Efficient Lighting Source	(Combined w/ 3.2)				
	3.6 Reflectors for Fluorescent Fixtures	:	:	:	:	:
		:	i	:	:	:
	3.8 Separate Switches to Control Lighting	3	;	:	:	:
	Reduce Street Lighting	:	:	:	i	!
	Hot Water					
	4.1 Control Hot Water Circulation Pump	į	ŧ	:	į	į
	4.2 Heat Reclaim from Family Housing Condenser	;	:	i	i	:
	4.3 Heat Reclaim from Hot Refrigerant Gas	:	;	i	:	;
	4.4 Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5 Decentralize Domestic Hot Water Heaters	(Combined w/ 4.3)				
	4.6 Install Shower Flow Restrictors/	:	;	:	:	;
	Limited Flow Showerheads	20.058	77 0023	\$270	87 0	7 81
		2000	17.4.74	0134	2	- -

	.8 Install Timeclocks		:	:	:	
	4.9 Shutdown Energy to Not Water Heater	:	;	:	:	;
	or Modify Controls					
λ.	. Electrical System					
	5.1 Improve Power Factor	;	:	:		:
	5.2 Transformer Overvoltage	:	:	:	•	:
	5.3 Transformer Loading	:	:	•	•	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
٠ <u>٠</u>	. HVAC System					
	6.1 Economizer Cycles (DB)	:	:	:	;	!
	6.2 Radiator Controls	:	:	:	:	;
	6.3 FM Radio Controls	:	:	:	:	:
	6.4 Chiller Replacement	:	:	:	:	:
	6.5 Chiller Controls	:	:	:	:	:
	6.6 Replace Absorption Chiller	`:	:	:	:	:
	6.7 Boiler Oxygen Irim Control (Fixed or Portable)	:	:	•	:	•
		:	:	:	:	:
	6.9 Insulate Steam & Condensate Lines	:	:	:	:	•
	6.10 Waste Heat Recovery	:	:	:	:	:
	6.11 Thermal Storage	;	:	:	:	:
	6.12 Steam Irap Inspection	:	:	:	:	;
	6.13 Revise or Repair Building HVAC Controls	:	:	:	:	:
	6.14 Night Setback/Setup Thermostats	:	:	:	:	•
	6.15 Infrared Heaters	:	:	:	:	:
	6.16 Air Curtains	:	:	:	:	:
	6.17 Prevent Air Stratification	:	:	:	:	:
	6.18 Reduce Airflows	:	:	:	:	;
	6.19 High Efficiency Motor Replacement	:	:	:	;	;
7.	7. Hotor/Equipment					
	7.1 High Efficiency Motor Replacement	:	;	:	:	•
	-					

TABLE 8-1.13: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 60-11

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
÷	Insulation					
- -	1.1 Insulation of Roof, Walls, etc. 1.2 Insulation of Piping	0.0038/LF	\$0.26/LF	*3.75/LF	14.4	0.81
2. E	Exterior Building Envelope					
"	2.1 Weather Stripping & Caulking	;	;	!	į	į
. •		:	:	;	į	:
.,		:	;	•	;	:
.4		;	:	;	;	:
.4		:	:	:	;	
	Water		:	:	:	:
"4	2.7 Solar Film	:	•	:	:	;
ำ	E-1 gar 1 mg					
۲,	3.1 Reduce Lighting Levels	:	;	i	į	;
۲,	3.2 Replace Incadescent Lights	0.235	\$4.69	\$ 25.90	5.5	2.11
ri		0.239	\$4.76	\$610.00	128.2	0.09
۲,						
		(Combined w/ 3.2)				
		:	:	:	;	:
	Occupancy Sensors to Control Li	:	:	:	:	:
~, ,	3.8 Separate Switches to Control Lighting	!	:	:	:	:
•	Keduce Street Lighting	!	:	; ; ;	:	:
	Not Water					
4	4.1 Control Hot Water Circulation Pump	i	;	:	į	;
4	4.2 Heat Reclaim from Family Housing Condenser		:	:	:	:
4	4.3 Heat Reclaim from Hot Refrigerant Gas		:	:	:	:
7	4.4 Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
7	_	(Combined w/ 4.3)				
*	4.6 Install Shower Flow Restrictors/	:		9	:	:
4	Limited Flow Showerheads 4.7 Repair Broken Domestic Hot Water Heat Pumps	33,512	\$667.69	\$270	07.0	8.04

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									•																			:
:	•			:	•	:		:	:	•	:	:	•	•	•	:	•		:	;	;	:	:	:	•	:		:
)	:			:	:	:		:	:	:	:	:	:	•		:	:	:	:		:	:	:	:	:	:		•
:	•			:	:	:		:	:	;	•	:	:	_	;	:	:	:	:	:	:	:	:	:	:	:		•
Install Timeclocks		or Modify Controls	Electrical System	Improve Power Factor	Transformer Overvoltage	Transformer Loading	System	Economizer Cycles (DB)	Radiator Controls	FM Radio Controls	Chiller Replacement	Chiller Controls	Replace Absorption Chiller	Boiler Oxygen Trim Control (Fixed or Portable)	Revise Boiler Controls	Insulate Steam & Condensate Lines) Waste Heat Recovery	Thermal Storage	2 Steam Trap Inspection	S Revise or Repair Building HVAC Controls	. Night Setback/Setup Thermostats	i Infrared Heaters	5 Air Curtains	7 Prevent Air Stratification	3 Reduce Airflows	High Efficiency Motor Replacement	Motor/Equipment	High Efficiency Motor Replacement
8.	6.4		5. Elec	5.1	5.2	5.3	6. HVAC	6.1	6.2	6.3	7.9	6.5	9.9	6.7	6.8	6.9	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.17	6.18	6.19	7. Hoto	7.1

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TABLE 8-1.14: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 60-III

			ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
-:	Insul	Insulation					
	1.1	Insulation of Roof, Walls, etc. Insulation of Piping	0.0038/LF	\$0.26/LF	**************************************	14.4	0.81
	Exter	Exterior Building Envelope					
	2.1	Weather Stripping & Caulking	į	ļ	į	!	!
	2.2	Vestibles	:	:	:	:	;
	2.3	Loading Dock Seals	:	:	;	:	;
	5.4	Reduction of Glass Area	:	:	:	:	:
	2.5	Low Emissivity Windows	:	:	:	:	:
	5.6	Water Spray Roof Cooling	•	:	:	:	:
	2.7	Solar Film	:	:	:	:	:
m.	Lighting	ting					
	3.1	Reduce Lighting Levels	:	:	;	i	;
	3.2	Replace Incadescent Lights	0.235	\$4.69	\$ 25.90	5.5	2.11
	3.3	Energy Conserving Fluorescent Light & Ballast	0.130	\$2.58	\$330.00	127.9	0.09
	3.4	Replace Kitchen Light Fixtures	(Combined w/ 3.3)				
	3.5	Use More Energy Efficient Lighting Source	(Combined w/ 3.2)				
	3.6	Reflectors for Fluorescent Fixtures	:	:	;	:	:
	3.7	Occupancy Sensors to Control Lighting	;	:	;	:	;
	3.8	Separate Switches to Control Lighting	:	;	;	:	;
	3.9	Reduce Street Lighting	:	;	:	!	:
	Hot Water	dater					
	4.1	Control Hot Water Circulation Pump	i	;	;	;	;
	4.2	Heat Reclaim from Family Housing Condenser	:	:	:	:	;
	4.3	Heat Reclaim from Hot Refrigerant Gas	:	:	;	;	;
	4.4	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
	4.5	Decentralize Domestic Hot Water Heaters	(Combined W/ 4.3)				
	9.4	Install Shower Flow Restrictors/	:	:	:	:	;
	4.7	Repair Broken Domestic Hot Water Heat Pumps	26.785	\$533.66	\$270	0.51	6.43

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8.	Install Timeclocks		:	:	:)
6.4	Shutdown Energy to Hot Water Heater or Modify Controls	į	į	:	•	
Elec	Electrical System					•
5.1	Improve Power Factor		•	į		:
5.2	Transformer Overvoltage	:	:	:	•	:
5.3	Transformer Loading	:	:	:	!	:
HVAC	HVAC System					
6.1	Economizer Cycles (DB)	:	;	:	:	i
6.2	Radiator Controls	:	:	:	:	:
6.3	FH Radio Controls	:	:	:	:	i
6.4	Chiller Replacement	:	:	:	:	:
6.5	Chiller Controls	:	:	:	:	:
6.6	Replace Absorption Chiller	:	:	:	:	:
6.7	Boiler Oxygen Trim Control (Fixed or Portable)	:	:	:	:	:
6.8	Revise Boiler Controls	:	:	:	:	
6.9	Insulate Steam & Condensate Lines	:	:	:	:	:
6.10	J Waste Heat Recovery	:	:	:	:	:
6.11	1 Thermal Storage	:	:	•	:	:
6.12	2 Steam Trap Inspection	:	:	:	:	:
6.13	5 Revise or Repair Building HVAC Controls	:	•	:	:	:
6.14		•	:	:	:	:
6.15	5 Infrared Heaters	•	:	:	:	:
6.16	5 Air Curtains		:	:	:	;
6.17	7 Prevent Air Stratification	:	:	:	:	i
6.18	3 Reduce Airflows	:	:	:	:	:
6.19	? High Efficiency Motor Replacement	:	:	:	:	;
otc	Motor/Equipment					
7.1	High Efficiency Motor Replacement	:	:	i	;	i

TABLE 8-1.15: ENERGY CONSERVATION OPPORTUNITIES FOR UNIT TYPE 71-1

	ANNUAL ELECTRICAL ENERGY	ANNUAL COST SAVINGS/	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
	MBTU/UNIT				
. Insulation					
1.1 Insulation of Roof, Walls, etc.	-	į	1 1 1	į	į
1.2 Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
. Exterior Building Envelope					
2.1 Weather Stripping & Caulking	;	;	•	!	į
	:	;	:	;	;
2.3 Loading Dock Seals	:	; ;	:	i	;
2.4 Reduction of Glass Area	:	:	•	:	:
2.5 Low Emissivity Windows	i	:	:	:	1
2.6 Water Spray Roof Cooling	:	:	:	:	;
2.7 Solar Film	:	:	:	:	;
. Lighting					
3.1 Reduce Lighting Levels	:	:	:	:	:
3.2 Replace Incadescent Lights	0.314	\$6.26	\$ 25.90	4.1	2.81
	:	:	•	:	:
	(Combined w/ 3.3)				
3.5 Use More Energy Efficient Lighting Source	(Combined w/ 3.2)				
3.6 Reflectors for Fluorescent Fixtures	:	:	:	:	;
3.7 Occupancy Sensors to Control Lighting	;	:	:	:	:
3.8 Separate Switches to Control Lighting	:	:	:	:	;
3.9 Reduce Street Lighting	:	:	!	•	:
. Not Water					
4.1 Control Hot Water Circulation Pump	:	į	;	į	i
4.2 Heat Reclaim from Family Housing Condenser	:	;	:	i	;
4.3 Heat Reclaim from Hot Refrigerant Gas	:	:	:	:	:
	5.810	\$38.56	\$1424	36.9	0.11
_	(Combined w/ 4.3)				
4.6 Install Shower Flow Restrictors/	:	:	:	:	•
Limited Flow Showerheads 4.7 Repair Broken Domestic Not Water Heat Pumps	33.512	\$667.69	\$270	0,.0	8.04

7

	8	Install Timeclocks		:		:	:
	6.4	Shutdown Energy to Hot Water Heater	:	:	•	:	:
		or Modify Controls					
٥.	Elect	Electrical System					
	5.1	Improve Power factor	:	į	i	;	:
	5.5	Transformer Overvoltage		:	:	i	:
	5.3	Transformer Loading	:	:	:	:	:
	HVAC	HVAC System					
	6.1	Economizer Cycles (DB)	:	:	:	:	:
	6.2	Radiator Controls	;	:	:	i	:
	6.3	FM Radio Controls	;	:	:	:	:
	4.9	Chiller Replacement	:	:	:	:	:
	6.5	Chiller Controls	:	:	:	:	:
	9.9	Replace Absorption Chiller	•	:	:	:	•
	6.7	Boiler Oxygen Trim Control (Fixed or Portable)	:	:	:	:	;
	8.8	Revise Boiler Controls	:	:	:	:	:
	6.9	Insulate Steam & Condensate Lines	:	:	:	:	
	6.10	Waste Heat Recovery	:	:	:	:	<u>:</u>
	6.11	Thermal Storage	:	:	:	:	:
	6.12	Steam Trap Inspection	:	:	:	:	:
	6.13	Revise or Repair Building HVAC Controls	:	:	:	:	:
	6.14	Night Setback/Setup Thermostats		:	:	i	;
	6.15	Infrared Heaters	;	:	:	:	:
	6.16	Air Curtains	:	:	:	:	:
	6.17	Prevent Air Stratification	•	:	:	;	;
	6.18	Reduce Airflows	:	:	•	:	:
	6.19	High Efficiency Motor Replacement	:	:	:	•	:
7.	Motor	7. Motor/Equipment					
	7.1	High Efficiency Motor Replacement	:	:	:	;	:

APPENDIX B-2
RANKING OF FEASIBLE ECO'S

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	S. R.
•	Repair Broken Domestic Hot Water Heat Pumps	40.239	\$801.72	\$270	0.34	9.65
.:	Replace Incadescent Lights	4.403	\$87.72	\$501	5.7	2.04
	Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11

	ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
Repair Broken Domestic Hot Water Heat Pumps	26.79	\$533.66	\$270	0.51	6.42
Replace Incadescent Lights	4.820	\$95.96	\$563.50	5.9	1.9
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11

	ANNUAL	ANNUAL.	ESTIMATED	SIMPLE	SIR
	ELECTRICAL	COST	CONSTRUCTION	PAYBACK	
	ENERGY	SAVINGS/	COST/UNIT	YEARS	
	SAVINGS	LINO			
	MBTU/UNIT				
	-				
Repair Broken Domestic Hot Water Heat Pumps	40.239	\$801.72	\$ 270	0.34	9.65
Replace Incadescent Lights	9.000	\$119.61	\$623	5.2	2.24
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Energy Conserving Fluorescent Light & Ballast	0.403	\$ 8.02	009\$	74.8	0.16
Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11

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		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	æ Sis
•	Repair Broken Domestic Hot Water Heat Pumps	20.058	\$399.63	\$270	0.68	4.81
	Replace Incandescent Lights	4.287	\$85.08	\$476	5.6	2.08
•	Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
	Energy Conserving Fluorescent Light & Ballast	0.403	\$ 8.02	009\$	74.8	0.16
	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11

	ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
Repair Broken Domestic Hot Water Heat Pumps	20.058	\$399.63	\$270	0.68	4.81
Replace Incandescent Lights	0.235	\$ 4.69	\$25.90	5.5	2.11
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Energy Conserving Fluorescent Light & Ballast	1.010	\$20.13	\$1800	7.68	0.13
Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11

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		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	S
	Repair Broken Domestic Hot Water Heat Pumps	20.058	\$399.63	\$270	0.68	4.81
.:	Replace Incadescent Lights	5.672	\$113.00	\$700	6.2	1.88
	Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11

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		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
•	Repair Broken Domestic Hot Water Heat Pumps	33.512	\$667.69	\$270	07.0	8.04
.•	Replace Incadescent Lights	5.041	\$100.44	\$661.50	9.9	1.7
•	Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
•	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
•	Energy Conserving Fluorescent Light & Ballast	0.109	\$ 2.18	\$280	128.4	0.09

SIMPLE	PAYBACK	YEARS		
ESTIMATED	CONSTRUCTION	COST/UNIT		
ANNUAL	COST	SAVINGS/	TINO	
ANNOAL	ELECTRICAL	ENERGY	SAVINGS	MBTU/UNIT

SIR

÷	1. Repair Broken Domestic Hot Water Heat Pumps	13.331	\$265.61	\$270	1.0	3.20
2.	2. Replace Incandescent Lights	4.212	\$83.91	\$451.50	5.4	2.17
m,	3. Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
*	4. Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	11

	ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SI R
Repair Broken Domestic Hot Water Heat Pumps	26.785	\$533.63	\$270	0.51	6.43
Replace Incadescent Lights	1,935	\$38.56	\$259	6.7	1.73
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11

	ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	a a
Repair Broken Domestic Hot Water Heat Pumps	26.785	\$533.63	\$270	0.51	6.43
Replace Incadescent Lights	1.621	\$32.30	\$182	5.6	2.06
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
Energy Conserving Fluorescent Light & Ballast	0.239	\$ 4.76	\$610	128.2	0.09

	ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
Repair Broken Domestic Hot Water Heat Pumps	20.058	\$399.64	\$270	89.0	4.81
Replace Incandescent Lights	1.464	\$29.17	\$154	5.3	2.20
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Instantaneous Hot Water Meaters	5.810	\$38.56	\$1424	36.9	0.11
Energy Conserving Fluorescent Light & Ballast	0.239	\$ 4.76	\$610	128.2	0.09

	ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
Repair Broken Domestic Hot Water Heat Pumps	20.058	\$399.64	\$270	99.0	4.81
Replace Incandescent Lights	0.235	84.69	\$25.90	5.5	2.11
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
Energy Conserving Fluorescent Light & Ballast	0.259	\$5.17	\$610	130.0	0.09

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	ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	TOTAL ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	81 81
Repair Broken Domestic Hot Water Heat Pumps	33.512	\$67.69	\$270	0.40	8.04
Replace Incadescent Lights	0.235	84.69	\$25.90	5.5	2.11
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11
Energy Conserving Fluorescent Light & Ballast	0.239	\$4.76	\$610	128.2	0.09

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	ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	S
Repair Broken Domestic Hot Water Heat Pumps	26.785	\$533.66	\$270	0.51	6.43
Replace Incadescent Lights	0.235	84.69	\$25.90	5.5	2.11
Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
Instantaneous Hot Water Meaters	5.810	\$38.56	\$1424	36.9	0.11
Energy Conserving Fluorescent Light & Ballast	0.130	\$2.58	\$330	127.9	0.09

		ANNUAL ELECTRICAL ENERGY SAVINGS MBTU/UNIT	ANNUAL COST SAVINGS/ UNIT	ESTIMATED CONSTRUCTION COST/UNIT	SIMPLE PAYBACK YEARS	SIR
- :	Repair Broken Domestic Hot Water Heat Pumps	33.512	\$667.69	\$270	0,40	8.04
2.	Replace Incadescent Lights	0.314	\$6.26	\$25.90	4.1	2.81
ŭ.	Insulation of Piping	0.0038/LF	\$0.26/LF	\$3.75/LF	14.4	0.81
4.	Instantaneous Hot Water Heaters	5.810	\$38.56	\$1424	36.9	0.11

APPENDIX C-1
SCOPE OF WORK

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11 September 1989 * 28 August 1989 CEPOD-ED-MI

* REVISED *
SCOPE OF WORK
FOR AN
ENERGY SAVINGS OPPORTUNITIES SURVEY (ESOS)

OF
SCHOFIELD BARRACKS FAMILY HOUSING
AREAS A, D, E, F, I, J, K-1

Performed as part of the ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

* 11 September 1989 * 28 August 1989

* REVISED * GENERAL SCOPE OF WORK FOR AN ENERGY SAVINGS OPPORTUNITY SURVEY(ESOS)

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 - 2. GENERAL
 - 3. PROJECT MANAGEMENT
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 - 5. PROJECT DOCUMENTATION
 - 5.1 ECIP Projects
 - 5.2 Non-ECIP Projects
 - 5.3 Nonfeasible ECOs
 - 6. DETAILED SCOPE OF WORK
 - 7. WORK TO BE ACCOMPLISHED
 - 7.1
 - 7.2
 - 7.3 Evaluate Selected ECOs
 - 7.4 Perform a Limited Site Survey
 - 7.5 Provide Programming or Implementation Documentation
 - 7.6 Submittals, Presentations and Reviews

ANNEXES

- A GENERAL ENERGY CONSERVATION OPPORTUNITIES
- B DETAILED SCOPE OF WORK
 - C REQUIRED DD FORM 1391 DATA
 - D EXECUTIVE SUMMARY GUIDELINE

1. BRIEF DESCRIPTION OF WORK: The Contractor shall:

- 1.1 Review for general information the previously completed Energy Engineering Analysis Program (EEAP) study and any other energy studies which were performed at this installation.
- 1.2 Reevaluate selected projects and energy conservation opportunities (ECOs) from previous studies to determine their economic feasibility based on revised criteria, current site conditions and technical applicability.
- 1.3 Evaluate selected ECOs to determine their energy savings potential and economic feasibility.
- 1.4 Perform a limited site survey of selected buildings or areas to insure that any methods of energy conservation which are practical and have not been evaluated in any previous energy study have been considered and the results documented.
- 1.5 Provide complete programming or implementation documentation for all recommended ECOs.
- 1.6 Prepare a comprehensive report to document the work performed, results and recommendations.

2. GENERAL

- 2.1 This study is intended to reevaluate energy conservation projects from previous studies which have not been implemented nor programmed for implementation and to identify/consider specific ECOs in buildings and areas that may have been overlooked previously or recently identified.
- 2.2 The information and analysis outlined herein are considered to be minimum essentials for adequate performance of this study.
- 2.3 The Contractor shall ensure that all methods of energy conservation which will reduce the energy consumption of the installation in compliance with the Energy Resources Management Plan including those listed in Annexes A and B have been considered and documented. All methods of energy conservation which are reasonable and practical shall be considered, including improvements of operational methods and rocedures as well as the physical facilities. All energy conservation

opportunities which produce energy or dollar savings shall be documented in this report. Any energy conservation opportunity considered infeasible shall also be documented in the report with reasons for elimination. A list of general energy conservation opportunities to be used when evaluating specific buildings or areas is included as Annex A to this scope. Each ECOs shall be considered, evaluated and documented in the report. The list is not intended to be restrictive but only to assure that basic and generally repetitive opportunities are addressed in the report. Some of the energy conservation opportunities in Annex A may not be applicable to the specific building or area at this installation. A statement to that effect is all that is required.

- 2.4 The study shall include the energy consuming buildings or areas listed in Annex B-1. The work in the areas may be reduced somewhat by building repetition.
- 2.5 The study shall consider the use of all energy sources. The energy sources may include electricity, natural gas, liquefied petroleum gas, bulk oil, other oil products, steam when procured, gasoline, coal, solar, etc.
- 2.6 The "Energy Conservation Investment Program (ECIP) Guidance", described in letter from CEHSC-FU, dated 25 April 1988 and revised by letter from CEHSC-FU-P, dated 15 June 1989, establishes criteria for ECIP projects and shall be used for performing the economic analyses of all ECOs and projects. Construction cost escalation for DD Form 1391 submission shall be calculated using the guidelines contained in AR 415-17 and the latest Tri-Service MCP Index. The Tri-Service MCP Index, when updated, is contained in the latest applicable edition of the Engineer Improvement Recommendation System (EIRS) bulletin.
- 2.7 Energy conservation opportunities determined to be technically and economically feasible shall be developed into projects acceptable to installation personnel. This may involve combining similar ECOs into larger packages which will qualify for ECIP or MCA funding, and determining, in coordination with installation personnel, the appropriate packaging and implementation approach for all feasible ECOs.
- 2.8 Projects which qualify for ECIP funding shall be identified, separately listed, and prioritized by the Savings to Investment Ratio (SIR).
- 2.9 All feasible non-ECIP projects shall be ranked in order of bighest to lowest SIR.

3. PROJECT MANAGEMENT

- 3.1 Project Managers. The Contractor shall designate a project manager to serve as a point of contact and liaison for work required under this contract. Upon award of this contract, the individual shall be immediately designated in writing. The Contractor's designated project manager shall be approved by the Contracting Officer prior to commencement of work. This designated individual shall be responsible for coordination of work required under this contract. The Contracting Officer will designate a project manager to serve as the Government's point of contact and liaison for all work required under this contract. This individual will be the Government's representative.
- 3.2 Installation Assistance. The Commanding Officer at each installation will designate an individual who will serve as the point of contact for obtaining information and assisting in establishing contacts with the proper individuals and organizations as necessary to accomplish the work required under this contract.
- 3.3 Public Disclosures. The Contractor shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.
- 3.4 Meetings. Meetings will be scheduled whenever requested by the Contractor or the Contracting Officer for the resolution of questions or problems encountered in the performance of the work. The Contractor and/or the designated representative(s) shall be required to attend and participate in all meetings pertinent to the work required under this contract as directed by the Contracting Officer. These meetings, if necessary, are in addition to the presentation and review conferences.
- 3.5 Site Visits, Inspections, and Investigations. The Contractor shall visit and inspect/investigate the site of the project as necessary and required during the preparation and accomplishment of the work.

3.6 Records

3.6.1 The Contractor shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone

- conversations, etc., with Government representative(s) relative to this contract in which the Contractor and/or designated representative(s) thereof participated. These records shall be dated and shall identify the contract number, and modification number if applicable, participating personnel, subject discussed and conclusions reached. The Contractor shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the records.
- 3.6.2 The Contractor shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number and modification number, if applicable. The Contractor shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the record of request or receipt of material.
- 3.7 Interviews. The Contractor and the Government's representative shall conduct entry and exit interviews with the Directorates of Facilities Engineering and Oahu Consolidated Housing Office before starting work at the installation and after completion of the field work. The Government's representative shall schedule the interviews at least one week in advance.
- 3.7.1 Entry. The entry interview shall thoroughly brief and describe the intended procedures for the survey and shall be conducted prior to commencing work at the facility. As a minimum, the interview shall cover the following points:
 - a. Schedules.
- b. Names of energy analysts who will be conducting the site survey.
 - c. Proposed working hours.
- d. Support requirements from the Directorates of Facilities Engineering and Oahu Consolidated Housing Offices.
- 3.7.2 Exit. The exit interview shall include a thorough briefing describing the items surveyed and probable areas of energy conservation. The interview shall also solicit input and advice from the Directorates of Facilities Engineering and Oahu Consolidated Housing.Offices.

- 4. SERVICES AND MATERIALS. All services, materials (except those specifically enumerated to be furnished by the Government), plant, labor, superintendence and travel necessary to perform the work and render the data required under this contract are included in the lump sum price of the contract.
- 5. PROJECT DOCUMENTATION. All energy conservation opportunities which the Contractor has considered shall be included in one of the following categories and presented in the report as such:
- 5.1 ECIP Projects. To qualify as an ECIP project, an ECO, or several ECOs which have been combined, must have a construction cost estimate greater than \$200,000, a Savings to Investment Ratio greater than one and a simple payback period of less than eight years. For ECAM and family housing projects, the \$200,000 limitation may not apply. The Contractor shall check with the installation for guidance. The overall project and each discrete part of the project shall have a SIR greater than one. For all projects meeting the above criteria, complete programming documentation will be required. Programming documentation shall consist of a DD Form 1391, life cycle cost analysis summary sheet(s) (with necessary backup data to verify the numbers presented), and a project development brochure (PDB). A life cycle cost analysis summary sheet shall be developed for each ECO and for the overall project when more than one ECO is combined. For projects and ECOs reevaluated from the previous studies, the backup data shall consist of copies of the original calculations and analysis, with new pages revising the original calculations and analysis. In addition, the backup data shall include as much of the following as is available: the increment of work the project or ECO was developed under in the previous study, title(s) of the project(s), the energy to cost (E/C) ratio, the benefit to cost (B/C) ratio, the current working estimate (CWE), and the payback period. This information shall be included as part of the backup data. The purpose of this information is to provide a means to prevent duplication of projects in any future reports.
- 5.2 Non-ECIP Projects. Projects which normally do not meet ECIP criteria, but which have an overall SIR greater than one shall be documented. The life cycle cost analysis summary sheet shall be completed through and including line 6 for all projects or ECOs. Each shall be analyzed to determine if they are feasible even if they do not meet ECIP criteria. These ECOs or projects may not meet the nonenergy qualification test. For projects or ECOs which meet this criteria, the life cycle cost analysis summary sheet, completely filled out, with all the necessary backup data to verify the numbers presented, a complete description of

the project and the simple payback period shall be included in the report. Additionally, these projects shall have the necessary documentation prepared, in accordance with the requirements of the Government's representative, for one of the following categories:

- a. Quick Return on Investment Program (QRIP). This program is for projects which have a total cost not over \$100,000 and a simple payback period of two years or less.
- b. OSD Productivity Investment Funding (OSD PIF). This program is for projects which have a total cost of more than \$100,000 and a simple payback period of four years or less.
- c. Productivity Enhancing Capital Investment Program (PECIP). This program is for projects which have a total cost of more than \$100,000 and a simple payback period of four years or less. The above programs are all described in detail in AR 5-4, Change No. 1.
- d. Regular Military Construction Army (MCA) Program. This program is for projects which have a total cost greater than \$200,000 and a simple payback period of eight to twenty-five years. Projects or ECOs which qualify for this program shall be economically analyzed in accordance with the requirements for Special Directed Studies in Engineering Technical Letter (ETL) 1110-3-332.
- e. Low Cost/No Cost Projects. These are projects which the Directorates of Facilities Engineering and Oahu Consolidated Housing Offices can perform using their resources.
- 5.3 Nonfeasible ECOs. All ECOs which the Contractor has considered but which are not feasible, shall be documented in the report with reasons and justifications showing why they were rejected.
- 6. DETAILED SCOPE OF WORK. The general Scope of Work is intended to apply to contract efforts for all Army installations included under this contract except as modified by the detailed Scope of Work for each individual installation. The detailed Scope of Work is contained in Annex B.
- 7. WORK TO BE ACCOMPLISHED.

- 7.3 Evaluate Selected ECOs. The Contractor shall analyze the ECOs listed in Annex A. These ECOs shall be analyzed in detail to determine their feasibility. Savings to Investment Ratios shall be determined using current ECIP guidance. The necessary data required for these projects may not be available, requiring the Contractor to visit the installation to obtain any necessary information. The Contractor shall provide all data and calculations needed to support the recommended ECO. All assumptions shall be clearly stated. Calculations shall be prepared showing how all numbers in the ECO were figured. Calculations shall be an orderly step-bystep progression from the first assumption to the final number. Descriptions of the products, manufacturers catalog cuts, pertinent drawings and sketches shall also be included. A life cycle cost analysis summary sheet shall be prepared for each ECO and included as part of the supporting data. For ECOs which would replace the existing heating, ventilating, and air conditioning (HVAC) system or significantly change it (such as converting a multizone system to a variable air volume (VAV system)) the Contractor is required to run a computer simulation to analyze the system and to determine the energy savings. This requirement to use computer modeling applies only to heated and air conditioned or air conditioned only buildings which exceed 8,000 square feet or heated only buildings in excess of 20,000 square feet. The computer program shall analyze the building on an hour-by-hour basis rather than the bin data method or bin data to simulate an hour-by-hour analysis. Unless the Building Loads Analysis and System Thermodynamic (BLAST) program is used, the Contractor shall submit a sample computer run with an explanation of all input and output data and a summary of program methodology and energy evaluation capabilities for approval by the Contracting Officer prior to use of the program for analysis. The computer program used must be comparable to the BLAST program.
- 7.4 Perform a Limited Site Survey. The Contractor shall conduct a limited site survey to evaluate the buildings or areas listed in Annex B. The list of ECOs in Annex A shall be used when evaluating these building or areas. This list is not intended to be restrictive but only to assure that these opportunities, as a minimum, are considered, discussed and documented in the report. The Contractor may be aware of other ECOs not included in Annex A that will produce energy, manpower or dollar savings. These should be evaluated the same as the other ECOs. Each of the items shall be considered and discussed in the report. Those items on the list which are not practical, have been previously accomplished, are nappropriate or can be eliminated from detailed analysis based on

preliminary analysis shall be listed in the report along with the reason for elimination from further analysis. All potential ECOs which are not eliminated by preliminary considerations shall be thoroughly documented and evaluated as to technical and economic feasibility. The Contractor shall obtain all the necessary data to evaluate the ECOs by conducting a site survey. However, the Contractor is encouraged to use any data that may have been documented in a previous study. The Contractor shall document his site survey on forms developed for the survey, or standard forms, and submit these completed forms as part of the report. All test and/or measurement equipment shall be properly calibrated prior to its use.

- 7.5 Provide Programming or Implementation Documentation. For projects or ECOs reevaluated or developed during this study, complete programming or implementation documentation shall be prepared by the Contractor.
- 7.5.1 Programming Documentation. For projects or ECOs which meet ECIP criteria and which the installation wants to submit as an ECIP project, complete programming documentation shall be prepared. Complete programming documentation consists of DD Form 1391, Project Development Brochure (PDB) and supporting data. These forms shall be separate from the narrative report. They shall be bound similarly to the final report in a manner which will facilitate repeated disassembly and reassembly.
- 7.5.1.1 Military Construction Project Data (DD Form 1391). These documents shall be prepared in accordance with AR 415-15 and the supplemental requirements in Annex C. A complete DD Form 1391 shall be prepared for each project. The form shall include a statement that the project results from an EEAP study. Documents shall be complete as required for submission to higher DA headquarters. These programming documents will require review and signatures by the proper installation personnel. All documents shall be completed except for the required signatures.
- 7.5.1.2 Project Development Brochure (PDB). Preparation of the PDB requires the Contractor to delineate the functional requirements of the project as related to the specific site. The Contractor shall prepare PDBs in accordance with AR 415-20 and TM 5-800-3. Most projects will not require all the forms and checklists included in the Technical Manual (TM). Only that information needed for the project shall be included. The PDB-I

format described in the TM shall be used for whatever information is needed.

- 7.5.2 Implementation Documentation. For feasible projects or ECOs which normally do not meet ECIP criteria, implementation documentation shall be prepared. Each feasible project or ECO shall be individually packaged and fully documented and included as a separate section in the volume containing the programming documentation. Each project or ECO shall have a complete description of the changes required, economic justifications, sketches, and other backup data included as a section in the report. The documentation required will be as determined by the Government's representative. Documentation required will be in the categories listed in paragraph 5.2. For the QRIP, OSD PIF and PECIP projects, documentation shall be prepared in accordance with the requirements of AR 5-4, Change No. 1. A sample implementation document, consisting of a DA Form 51082R, sketches and manufacturers data and a life cycle cost analysis summary sheet shall be submitted for review and approval. This sample shall be submitted with the interim submittal. This sample shall be approved before any other implementation documents are prepared. To the degree possible, the project or ECO selected for the sample submission shall be typical of the majority of subsequent projects to be submitted. The sample shall consist of complete implementation documents with primary emphasis on format and manner of presentation rather than precise accuracy of cost estimates and energy savings data. For MCA projects the documentation required shall be in accordance with paragraph 7.5.1 except that the economic analysis required by ETL 1110-3-332 shall be included in lieu of the ECIP life cycle cost analysis. For low cost/no cost projects which the Directorate of Facilities Engineering and Oahu Consolidated Housing Office personnel can perform, the following information shall be provided:
 - a. Brief description of the project.
 - b. Brief description of the reasons for the modification.
 - c. Specific instructions for performing the modification.
 - d. Estimated dollar and energy savings per year.
- e. Estimated manhours and labor and materials costs. Costs shall be calculated for the current calendar year and so marked. Manhours shall be listed by trade. For projects that would repair an existing system so that it will function properly, also include the estimated manhours by

trade and labor and material costs necessary to maintain the system in that condition. Some of the simple practical modifications may be developed on a per unit basis. An example of this type of modification would be the repair or replacement of steam traps on an as needed basis. As a rule, however, the Contractor should develop complete projects, if at all possible, rather than per unit modifications.

Separate sheets for each project showing the above information shall be prepared and included in the report.

- 7.6 Submittals, Presentations and Reviews. The work accomplished shall be fully documented by a comprehensive report. The report shall have a table of contents and be indexed. Tabs and dividers shall clearly and distinctly divide sections, subsections, and appendices. All pages shall be numbered. The Contractor shall give a formal presentation of all but the final submittal to installation, command, and other Government personnel. The Contractor shall prepare slides or view graphs showing the results of the study to date for his presentation. During the presentation, the personnel in attendance shall be given ample opportunity to ask questions and discuss any changes deemed necessary to the study. A review conference will be conducted the same day, following the presentation. Each comment presented at the review conference will be discussed and resolved or action items assigned. The Contractor shall provide the comments from all reviewers and written notification of the action taken on each comment to all reviewing agencies within three weeks after the review meeting. It is anticipated that each presentation and review conference will require approximately one working day. The presentation and review conferences will be at the installation on the date(s) agreeable to the Directorate of Facilities Engineering, Oahu Consolidated Housing Office, the Contractor and the Government's representative. The Contracting Officer may require a resubmittal of any document(s), if such document(s) are not approved because they are determined by the Contracting Officer to be inadequate for the intended purpose.
- 7.6.1 Interim Submittal. An interim report shall be submitted for review after completion of the field survey and an analysis has been performed on all of the ECOs. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken and contain a plan of the work remaining to complete the study. Calculations showing energy and dollar savings and SIRs of all the ECOs shall be included. The simple payback period of all ECOs shall be calculated and shown in the report. The Contractor shall submit the Scope of Work and any modifications to the Scope of Work as

an appendix to the report. A narrative summary describing the work and results to date shall be a part of this submittal. During the review period. the Government's representative shall coordinate with the Directorate of Facilities Engineering and Oahu Consolidated Housing Office and provide the Contractor with direction for packaging or combining ECOs for programming purposes and also indicate the fiscal year for which the programming or implementation documentation shall be prepared. A sample implementation document (DA Form 5108-R, sketches and manufacturers data, life cycle cost analysis summary sheet and supporting data) for one project shall be submitted with this submittal for review and approval. The survey forms completed during this audit shall be submitted with this report. The survey forms only may be submitted in final form with this submittal. They should be clearly marked at the time of submis-sion that they are to be retained. They shall be bound in a standard three-ring binder which will allow repeated disassembly and reassembly of the material contained within.

7.6.2 Prefinal Submittal. The Contractor shall prepare and submit the prefinal report when all work under this contract is complete. The Contractor shall submit the Scope of Work for the installation studied and any modifications to the Scope of Work as an appendix to the submittal. The report shall contain a narrative summary of conclusions and recommendations, together with all raw and supporting data, methods used, and sources of information. The report shall integrate all aspects of the study. The report shall include an order of priority by SIR in which the recommended ECOs should be accomplished. The synergistic effects of all of the ECOs on one another shall have been determined and the results of the original calculations adjusted accordingly. Completed programming and implementation documents for all recommended projects shall be included. The programming and implementation documents shall be ready for review and signature by the installation commander. The prefinal report, separately bound Executive Summary and all appendices shall be bound in standard three-ring binders which will allow repeated disassembly and reassembly. The prefinal submittal shall be arranged to include (a) a separately bound Executive Summary to give a brief overview of what was accomplished and the results of this study using graphs, tables and charts as much as possible (See Annex D for minimum requirements), (b) the narrative report containing a copy of the Executive Summary at the beginning of the volume and describing in detail what was accomplished and the results of this study, (c) appendices to include the detailed calculations and all backup material and (d) the programming and implementation documentation. A list of all projects and ECOs developed during this study shall be included in the Executive Summary and shall

include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date. For all programmed projects also include the year in which it is programmed and the programmed year cost.

7.6.3 Final Submittal. Any revisions or corrections resulting from comments made during the review of the prefinal report or during the presentation and review conference shall be incorporated into the final report. These revisions or corrections may be in the form of replacement pages, which may be inserted in the prefinal report, or complete new volumes. Pen and ink changes or errata sheets will not be acceptable. If replacement pages are to be issued, it shall be clearly stated with the prefinal submittal that the submitted documents will be changed only to comply with the comments made during the prefinal conference and that the volumes issued at the time of the prefinal submittal should be retained. Failure to do so will require resubmission of complete volumes. If new volumes are submitted, they shall be in standard three-ring binders and shall contain all the information presented in the prefinal report with any necessary changes made. Detailed instructions of what to do with the replacement pages should be securely attached to the replacement pages.

* REVISED * ANNEX A

GENERAL ENERGY CONSERVATION OPPORTUNITIES

- o Insulation (wall, roof, pipe, duct, etc.)
- o Insulated glass or double glazed windows
- o Weather stripping & caulking
- o Insulated panels
- o Solar films
- o Vestibules
- o Load dock seals
- o Reduction of glass area
- o Replace kitchen light fixtures
- o Shutdown energy to hot water heaters or modify controls
- o Energy conserving fluorescent lamps and ballast
- o Reduce lighting levels
- o Replace incandescent lighting
- o Use more efficient lighting source
- o Improve power factor
 - o High efficiency motor replacement
 - o Night setback/setup thermostats
 - o Infrared heaters

- o Economizer cycles (dry bulb)
- o Control hot water circulation pump
- o FM radio controls
- o Radiator controls
- o Decentralize domestic hot water heaters
- o Install shower flow restrictors or limited flow showerheads (2 to 3 GPM)
 - o Heat reclaim from hot refrigerant gas
 - o Reduce air flow
 - o Prevent air stratification
- /o Install time clocks
 - o Boiler oxygen trim control (fixed or portable)
 - Revise boiler controls
 - o Chiller replacement
 - o Chiller controls
 - o Replace absorption chiller
 - o Reduce street lights
 - o Insulate steam and condensate lines
 - o Return condensate
 - o Heat reclaim from family housing condenser units for preheating of domestic hot water
 - o Domestic hot water heat pumps
 - o Transformer overvoltage

- o Transformer loading
- o Revise or repair building HVAC controls
- o Waste heat recovery
- o Thermal storage
- o Steam trap inspection
- o Instantaneous hot water heater
- o Air curtains
- o Occupancy sensors to control lighting or HVAC
- o Reflectors for fluorescent fixtures
- o Water spray roof cooling
- o Photocells to control lighting
- o Low emissivity windows
- o Separate switches to control lighting arrangements

ANNEX B

- 1. A general Energy Saving Opportunities Survey (ESOS) shall be conducted for Family Housing in Areas A, D, E, F, I, J, and K-1, at Schofield Barracks, Oahu, Hawaii. The survey consists of 444 Family Housing Units. The breakdown by Areas and Type of Quarters are shown at Annex B-1. The evaluation should include but not be limited to the energy conservation opportunities listed in Annex A.
- 2. Report submittals and reviews: Documents will be submitted in accordance with the following:

3	Submittal	Calendar Days After NTP	Govt Review Calendar Days	No. of Copies
a.	Interim	120	30	11
b.	Prefinal	195	30	11
c.	Final	255	NA	,12

Distribution of report: The contractor will make distribution of the interim, prefinal and final reports with a forwarding letter requesting that addressees review and return comments within the above specified Government review period to:

> Commander U.S. Army Engineer Division, Pacific Ocean ATTN: CEPOD-ED-MI Bldg 230 Fort Shafter, HI 96858-5440

Distribution as follows:

(1) Three (3) copies to: Commander U.S. Army Support Command, Hawaii ATTN: APZV-FEC (Mr. Date) Fort Shafter, HI 96858-5000 (2) Three (3) copies to: Commander U.S. Army Support Command, Hawaii

Hawaii ATTN: APZV-OH (Mr. Machado)

Fort Shafter, HI 96858-5000

(3) Two (2) copies to:

Commander

U.S. Army Western Command ATTN: APEN-IC (Mr. Slenkamp) Fort Shafter, HI 96858-5100

(4) Three (3) copies to:

Commander

U.S. Army Engineer Division,

Pacific Ocean

ATTN: CEPOD-ED-MI (Mr. Lindsey)

Bldg 230,

Fort Shafter, HI 96858-5440

b. One copy of the completed final report with a cover letter identifying the project shall be sent to:

Mobile District CESAM-EN-CC P.O. Box 2288 Mobile, AL 36693

c. One copy of the executive summary shall be sent to:

Commander U.S. Army Corps of Engineers ATTN: CEEC-EE (Mr. D. Beranek) Washington, D.C. 20314-1000

- 4. PAYMENTS. Monthly payment shall be made on the Contractor's estimate of work accomplished upon submission on ENG Form 93, Payment Estimate-Contract Performance. This form shall include Contractor's certification that the payment estimate is correct and just, and the requested payment has not been received. In addition, with each certified payment request, the Contractor shall submit a concise progress report delineating work completed and problems encountered. The Contracting Office requires the Contractor billings be submitted to U.S. Army Engineer Division, Pacific Ocean, ATTN: CEPOD-ED-MI by the 15th of each month. Upon approval, payment shall be made of ninety (90) percent of the amount as determined above. Upon satisfactory completion of all work under this contract, the Contractor will be paid the unpaid balance of any money due including ten (10) percent retained in previous payments.
- 5. USE OF INFORMATION. The information developed, gathered, assembled

- and reproduced by the Contractor or his Consultants, Sub-Contractors or their associates in fulfillment of the contract requirements as defined or related to the Scope of Work will become the complete property of the Government and will, therefore, not be used by the Contractor for any purpose at any time without the written consent of the Contracting Officer.
- 6. GOVERNMENT PROJECT MANAGER. The Government has designated a Project Manager (CEPOD-ED-MI) within POD who will serve as the main point of contact for the Contracting Officer: David Lindsey, telephone 438-6938. The Project Manager will serve as the designated Government Representative for the Contracting Officer.
- 7. OCFHO POINT OF CONTACT. The OCFHO, USASCH coordinator to serve as the point of contact and liaison for all work is: Mr. Harold Machado, telephone 655-8943, Building 690, Schofield Barracks, Hawaii. The OCFHO coordinator will be responsible for arranging clearance into the site for field investigation.
- 8. DFE POINT OF CONTACT. The DFE, USASCH coordinator to serve as the point of contact and liaison for all work is: Mr. James Date, telephone 655-4954, Building 372, Schofield Barracks, Hawaii.
- 9. COORDINATION. During the prosecution of the work, close liaison shall be maintained with the CEPOD-ED-MI who will coordinate the work with other elements of DFE, OCFHO, USASCH, and WESTCOM. All correspondence and submittals will be coordinated through the CEPOD-ED-MI. All routine correspondence concerning field information, access, interface with utilities, etc., will be made directly with the organizations involved. However, the CEPOD-ED-MI will be kept informed of all coordination being made. All required coordination of a special nature will be made through the designated Government Representative only. Under no circumstances will any information concerning any matters directly related to the criteria, scope, scheduling or progress of projects under this Scope of Work be divulged to any individual or organization without specific approval of the Contracting Officer or the designated Government Representative. All requests made by the Using Service and other agencies shall be referred to the designated Government Representative. Arrangements for visits to office of the Using Service, meetings, and coordination (other than routine) as required with other agencies will be made by the designated Government Representative upon request.
- 10. QUALITY REQUIREMENTS. The Contractor is responsible for the quality

- of all work accomplished under this contract. The review and checking of documents by DFE, OCFHO, USASCH, and WESTCOM does not relieve the Contractor of any responsibility. If errors are discovered at a later date, the Contractor shall be required to make necessary changes or perform other corrective action. Completed work will be transmitted by a letter signed by a principal of the firm certifying that all information has been coordinated and is complete and correct.
- 11. REFERENCES/GOVERNMENT FURNISHED INFORMATION. The following references apply to energy considerations and will be furnished by the Government at the specific request of the Contractor on a case by case basis for the period of the contract:
 - a. Energy Resources Management Plan
- b. Engineer Technical Letters (ETLs) 1110-3-254, Use of Electric Power for Comfort Space Heating; 1110-3-282, Energy Conservation; and 1110-3-332, Economic Studies.
- c U.S. Army Corps of Engineers, Architectural and Engineering Instructions Design Criteria, 13 March 1987.
- d. Energy Conservation Investment Program (ECIP) Guidance, dated 25 April 1988 and 15 June 1989.
- e. Technical Manual TM 5-785, Engineering Weather Data, TM 5-800-2, General Criteria Preparation of Cost Estimates, and TM 5-800-3, Project Development Brochure.
- f. AR 415-15, Military Construction Army (MCA) Program
 Development, AR 415-17, Cost Estimating for Military Programming, AR
 415-20, Construction, Project Development and Design Approval, AR 41528, Department of the Army Facility Classes and Construction Categories,
 AR 415-35 Construction, Minor Construction, AR 420-10, General
 Provisions, Organization, Functions, and Personnel, and AR 5-4, Change No.
 1, Department of the Army Productivity Improvement Program and AR 1127, Army Energy Program.
- g. Engineer Improvement Recommendation System (EIRS) Bulletin 84-01 and Tri-Service Military Construction Program (MCP) Index (Most current edition).
 - 12. All ECIP projects will be based on the fiscal year established

- subsequent to the Interim Review Conference for cost estimation, programming and implementation.
- 13. Thirty-five millimeter (35mm) color slides will be provided for ECIP projects reflecting existing conditions which can be used as supporting documentation for ECIP project approval.
- 14. A computer program titled Life Cycle Costing in Design (LCCID) is available from the Blast Support Office in Urbana, Illinois for a nominal fee. This computer program shall be used for performing the economic calculations for ECIP and non-ECIP ECOs. The Blast Support Office can be contacted at 144 Mechanical Engineering Building, 1206 West Green Street, Urbana, Illinois 61801. The telephone number is (217) 333-3977.

ANNEX B-1

BUILDING	TYPE	APARTMENT	BORMS	STORIES	AREA
49	32-1	•	2	1	Α
50	32-1	•	2	1	Â
5 1	32-1	-	2	•	Ā
52	32-1	•	2	1	A
5 3	32-1	•	2	1	Ä
54	32-1	•	2	1	A
55	32-1	•	2	1	Ä
56	32-1	•	2	. 1	Ä
57	32-1	•	2	1	Ä
58	32-1	•	2	1	Ä
60	32-1	-	2	1	Ä
61	32-11	•	2	1	A
62	32-11	•	2	1	A
63	32-11	-	2	1	Ä
64	32-11	-	2	1	A
65	32-11	•	2	· 1	Ä
66	32-11	•	2	1	Ä
71	32-11	•	2	1	A
72	32-11	•	2	1	A
73	32-11	•	2	1	A
74	32-11	•	2	1	Ā
75	32-11	•	2	1	A
8 1	71-1	A,B	4	1	Ä
83	71-l	A,B	4	1	Ä
85	71-1	•	4	1	Ä
410	20-11	•	4	1	D
425	20-11	•	4	1	D
426	20-11	•	4	1	D
441	20-11	•	4	1	D
442	20-11	•	4	1	D
401	20-111	-	3	1	D
402	20-111	-	3	1	D
403	20-111	•	3	1	D
404	20-111	•	3 3	1	D
405	20-111	•	3	1	D
406	20-111	•	3 3	1	D
407	20-111	•		1	D
408	20-111	•	3	1	D
411	20-111	•	3	1	D
412	20-111	•	3	1	D
413	20-111	•	3	1	D
414	20-111	•	3	1	D
415	20-111	•	3 3 3	1	D
416	20-111	•	3	1	D
417	20-111	•	3	1	D
418	20-111	•	3	1	D

BUILDING	TYPE	APARTMENT	BORMS	STORIES	AREA
419	20-111	-	3	1	D
420	20-111	•	3	1	D
421	20-111	•	3	1	D
422	20-111	•	3	1	D
423	20-111	•	3	1	D
424	20-111	•	3	1	D
427	20-111	•	3	1	D
428	20-111	•	3	1	D
429	20-111	•	3	1	D
430	20-111	•	3	1	D
431	20-111	•	3	1	D
432	20-111	-	3	1	D
433	20-111	•	3	1	D
434	20-111	•	3	1	D
435	20-111	•	3	i	D
436	20-111	•	3	` 1	D
437	20-111	-	3	1	D
438	20-111	•	3	1	D
439	20-111	•	3	1	D
440	20-111	•	3	1	D
443	20-111	•	3	1	D
444	20-111	•	3	1	D
445	20-111	•	3	1	D
446	20-111	•	3	1	D
447	20-111	•	3	1	D
448	20-111	•	3	1	D
409	57-1	A,B	2	1	D
510	20-11	•	4	1	E
525	20-11	•	4	1	E
526	20-11	•	4	1	E
542	20-11	•	4	1	E
501	20-111	•	3	1	
502	20-111	•	3	1	E
503	20-111	•	3 3	1	E
504	20-111	•	3	1	F
505	20-111	•	3	1	E
506	20-111	-	3	1	E
507	20-111	•	3	1	E
508	20-111	•	3	1	
511	20-111	•	3 3 3 3	1	E
512	20-111	•	3	1	E
513	20-111	•	3	1	E
514	20-111	•	3	1	E
515	20-111	•	3 3	1	E
516	20-111	•	3	1	E
517	20-111	•	3 3	1	
			_	•	-

BUILDING	TYPE	APARTMENT	BDRMS	STORIES	AREA
518	20-111	•	3	1	E
519	20-111	•	3	1	E
520	20-111	•	3	1	E
521	20-111	•	3	1	E
523	20-111	•	3	1	Ē
524	20-111	•	3	1	E
527	20-111	•	3	1	E
528	20-111	•	3	1	E.
529	20-111	•	3	1	E
530	20-111	•	3	1	E
531	20-111	•	3	1	Ε
5 32	20-111	•	3	1	E
533	20-111	•	3	1	E
534	20-111	•	3	1	E
535	20-111	•	3	1	E
536	20-111	•	3	1	E
537	20-111	•	3	1	E
538	20-111	•	3	1	E
539	20-111	•	3	1	Ε
540	20-111	•	3	1	Ε
543	20-111	•	3	1	E
544	20-111	•	3	1	Ε
545	20-111	•	3	1	E
546	20-111	-	3	1	E
547	20-111	•	3	1	E
548	20-111	•	3	1	E
509	20-VI	•	5	1	E
601	32-111	•	3	1	F
603	32-111	•	3	1	F
605	32-111	•	3	1	F
607	32-111	•	3	1	F
609	32-111	•	3	1	F
611	32-111	•	3	1	F
613	32-111	•	3	1	F
614	32-111	•	3 3	1	F
615	32-111	-		1	F
616	32-111	•	3	1	F
617 618	32-111	•	3	1	F
619	32-111	•	3	1	F
621	32-111	•	3	1	F
622	32-111 32-111	•	3	1	F
623	32-111	•	3	1	F
624	32-111	•	3	1	F
625	32-111	_	3	1	F
626	32-111	•	3 3	1	F F
020	32-111	•	J	1	۲

		70.00	4 D 4 D T 4 F 1 F 1	DDD: 10	~~~	
j	BUILDING	TYPE	APARTMENT	BORMS	STORIES	AREA
	627	32-111	•	3	1	F
	628	32-111	•	3	1	F
	629	32-111	•	3	1	F
	631	32-111	•	3	1	F
	635	32-111	•	3	1	F
	637	32-111	•	3	1	F
	639	32-111	•	3	1	F
••	600	32-1V	•	4	1	F
	602	32-1V	•	4	1	F
	604	32-1V	•	4	1	F
	606	32-1V	•	4	1	F
	608	32-1V	•	4	1	F
	610	32-1V	•	4	1	F
	612	32-IV	•	4	1	F
	620	32-1V	•	4	. 1	F
	633	32-1V	•	4	1	F
	701	20-11	•	4	1	1
	712	20-11	•	4	1	ı
	713	20-11	•	4	1	1
	734	20-11	•	4	1	i
	735	20-11	•	4	1	ì
	702	20-111	•	3	1	1
	703	20-111	-	3	1	1
	704	20-111	-	3	1	1
	705	20-111	•	3	1	i
	706	20-111	-	3	1	i
	707	20-111	•	3	1	1
	708	20-111	•	3	1	1
	709	20-111	-	3	1	ĺ
	710	20-111	•	3	1	1
	711	20-111	•	3	1	1
	714	20-111	•	3	1	ĺ
	715	20-111	•	3	1	1
	716	20-111	•		1	1
	717	20-111	•	3 3	1	1
	718	20-111	•	3	1	i
	719	20-111	•	3	1	1
	720	20-111	•	3	1	1
	721	20-111	•	3	1	1
	722	20-111	•	3 3	1	1
	723	20-111	•	3	1	1
	724	20-111	•	3	1	i
	725	20-111	•	3	1	i
	726	20-111	•	3	1	i
	727	20-111	•	3	i i	i
	728	20-111	•	3	1	i
-						•

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	BUILDING	TYPE	APARTMENT	BDRMS	STORIES	AREA
	729	20-111	•	3	1	1
	730	20-111	•	3	1	1
	731	20-111	•	3	1	1
	732	20-111	•	3	1	Ī
	733	20-111	•	3	1	i
	736	20-111	•	3	1	i
	737	20-111	•	3	1	i
•	738	20-111	•	3	1	i
	739	20-111	•	3	i	i
	740	20-111	•	3	1	i
	741	20-111	•	3	1	i
	742	20-111	•	3	1	i
	743	20-111	•	3	1	i
	744	20-111	•	3	. 1	
	736	57-1	A,B	2	1	i
	803	20-IV	•	3	1	j
	804	20-IV	•	3	1	J
	805	20-IV	-	3	1	J
	806	20-IV	•	3	1	J
	807	20-IV	•	3	1	J
	808	20-IV	•	3	1	J
	809	20-1V	•	3	1	J
	816	20-IV	•	3	1	J
	817	20-IV	•	3	1	J
	818	20-IV	•	3	1	J
	819	20-IV	•	3	i	j
	820	20-IV	-	3	1	Ĵ
	821	20-IV	•	3	1	Ĵ
	822	20-IV	•	3	1	J
	823	20-IV	•	3	1	J
	824	20-IV	•	3	1	J
	825	20-1V	•	3	1	J
	826	20-IV	•	3	1	Ĵ
	827	20-IV	•	3	1	J
	828	20-IV	•	3 3 3 3	1	J
	829	20-IV	-	3	1	J
	836	20-IV	•	3	i i	J
	837	20-IV	-	3	1	J
	838	20-IV	•	3	1	Ĵ
	839	20-IV	•	3	1	Ĵ
	840	20-IV	•	3	1	Ĵ
	841	20-IV	•	3	1	Ĵ
	842	20-IV	•	3	1	J
	843	20-IV	•	3	1	J
	810	20-V	A,B	2	i	J
7	811	20-V	A,B	2	1	J
					-	-

BUILDING	TYPE	APARTMENT	BORMS	STORIES	AREA
830	20-V	A,B	2	1	J
831	20-V	A,B	2	1	Ĵ
832	20-V	A,B	2	1	J
833	20-V	A,B	2	1	Ĵ
844	20-V	A,B	2	1	Ĵ
802	57-1	A,B	2	1	Ĵ
814	57-1	A,B	2	1	J
835 ·	57-1	A,B	2	i	J
3401	57-11	A,B	3	2	K-1
3402	57-11	A,B	3	2	K-1
3405	57-II	A,B	3	2	
3406	57-11	A,B	3		K-1
3410	57-11			2	K-1
3411		A,B	3	2	K-1
	57-11	A,B	3	2	K-1
3413	57-11	A,B	3	2	K-1
3414	57-11	A,B	3	. 2	K-1
3415	57-11	A,B	3	2	K-1
3416	57-11	A,B	3	2	K-1
3417	57-11	A,B	3	2	K-1
3420	57-11	A,B	3	2	K-1
3421	57-11	A,B	3	2	K-1
3424	57-11	A, B	3	2	K-1
3426	57-11	A, B	3	2	K-1
3501	57-11	A,B	3	2	K-1
3502	57-11	A,B	3	2	K-1
3503	57-11	A,B	3	2	K-1
3505	57-11	A,B	3	2	K-1
350 6	57-11	A,B	3	2	K-1
3509	57-11	A,B	3	2	K-1
3510	57-11	A,B	3	2	K-1
3512	57-11	A,B	3	2	K-1
3513	57-11	A,B	3	2	K-1
3514	57-11	A,B	3	2	K-1
3517	57-11	A,B	3	2	K-1
3520	57-11	A,B	3	2	K-1
3522	57-11	A,B	3	2	
3523	57-11				K-1
3524	57-11	A,B	3	2	K-1
3601	57-11	A,B	3	2	K-1
3604		A,B	3	2	K-1
3613	57-II	. A, B	3	2	K-1
3614	57-11	A,B	3	2	K-1
3403	57-11	A,B	3	2	K-1
	57-111	A,B	3	1	K-1
3409	57-111	A,B	3	1	K-1
3418	57-111	A,B	3	1	K-1
3419	57-111	A,B	3	1	K-1

BUILDING	TYPE	APARTMENT	BDRMS	STORIES	AREA
3423	57-111	A,B	3	1	K-1
3508	57-111	A,B	3	1	K-1
3515	57-111	A,B	3	1	K-1
3518	57-111	A,B	3	1	K-1
3603	57-111	A,B	3	1	K-1
3611	57-111	A,B	3	1	
3427	57-IV	A,B,C,D	3		K-1
3432	57-1V	A,B,C,D		2	K-1
3433	57-IV		3	2	K-1
3434	57-IV	B,C	3	2	K-1
3436	57-IV 57-IV	B,C	3	2	K-1
3438		B,C	3	2	K-1
3440	57-IV	B,C	3	2	K-1
3440	57-IV	B,C,D,E	3	2	K-1
3444	57-IV	B,C	3	2	K-1
3445	57-IV 57-IV	A,B,C,D	3	2	K-1
3448		B,C	3	` 2	K-1
3605	57-IV	B,C	3	2	K-1
3606	57-IV	B,C	3	2	K-1
3610	57-IV	A,B,C,D	3	2	K-1
3617	57-IV	A,B,C,D	3	2	K-1
3618	57-IV	B,C	3	2	K-1
3620	57-1V	B,C	3	2	K-1
3621	57-IV	B,C	3	2	K-1
3624	57-IV	A,B,C,D	3	2	K-1
	57-IV	B,C	3	2	K-1
3625	57-IV	B,C	3	2	K-1
3626	57-IV	B,C	3	2	K-1
3627	57-IV	B,C	3	2	K-1
3630	57-IV	B,C	3	2	K-1
3631	57-IV	B,C	3	2	K-1
3632	57-IV	B,C	3	2	K-1
3633	57-IV	B,C	3	2	K-1
3636	57-IV	B,C,D,E	3	2	K-1
3637	57-IV	B,C	3	2	K-1
3638	57-IV	B,C,D,E	3	2	K-1
3641	57-IV	B,C,D,E	3	2	K-1
3642	57-IV	B,C	3 3	2	K-1
3644	57-IV	B,C		2	K-1
3646	57-IV	B,C	3	2	K-1
3648	57-IV	B,C	3	2	K-1
3701	57-IV	B,C	3	2	K-1
3702	57-IV	B,C	3	2	K-1
3703	57-IV	B,C	3	2	K-1
3706	57-IV	B,C	3	2	K-1
3707	57-IV	B,C	3	2	K-1
3710	57-IV	B,C	3	2	K-1

BUILDING	TYPE	APARTMENT	BORMS	STORIES	AREA
) 3711	E7 11/	P.C	•	•	14.4
3716	57-1V 57-1V	B,C	3	2	K-1
3717	57-1V 57-1V	B,C	3	2	K-1
3717	57-1V	B,C	3	2	K-1
3721	57-1V	B,C	3	2	K-1
3801		B,C	3	2	K-1
	57-IV	B,C	3	2	K-1
3802	57-IV	B,C	3	2	K-1
3803	57-IV	B,C	3	2	K-1
3805	57-IV	B,C,D,E	3	2	K-1
3806	57-IV	B,C	3	2	K-1
3809	57-IV	B,C	3	2	K-1
3810	57-IV	A,B,C,D	3	2	K-1
3812	57-IV	B,C	3	2	K-1
3814	57-IV	B,C	3	2	K-1
3815	57-IV	B,C	3	2	K-1
3817	57-IV	B,C	3	. 2	K-1
3903	57-1X	A,B,C,D	3	2	K-1
3908	57-1X	A,B,C,D	3	2	K-1
3909	57-IX	A,B,C,D	3	2	K-1
3910	57-IX	A,B,C,D	3	2	K-1
3427	57-V	Ε	2	1	K-1
3432	57-V	E	2	1	K-1
3433	57-V .	A,D	2	1	K-1
3434	57-V	A,D	2	· 1	K-1
3436	57-V	A,D	2	. 1	K-1
3438	57-V	A,D	2	1	K-1
3440	57-V	Α	2	1	K-1
3442	57-V	A,D	2	1	K-1
3444	57-V	E	2	1	K-1
3445	57-V	A,D	2	1	K-1
3448	57-V	A,D	2	1	K-1
3605	57-V	A,D	2	1	K-1
3606	57-V	E	2	1	K-1
3610	57-V	E	2	1	K-1
3617	57-V	A,D	2	1	K-1
3618	57-V	A,D	2	1	K-1
3620	57-V	A,D	2	1	K-1
3621	57-V	E	2	1	K-1
3624	57-V	A,D	2	1	K-1
3625	57-V	A,D	2	1	K-1
3626	57-V	A,D	2	1	K-1
3627	57-V	A,D	2	i	K-1
3630	57-V	A,D	2	1	K-1
3631	57-V	A,D	2	1	K-1
3632	57-V	A,D	2	1	K-1
3633	57-V	A,D	2	1	K-1

BUILDING	TYPE	APARTMENT	BORMS	STORIES	AREA
3636	57-V	Α	2	1	K-1
3637	57-V	A,D	2	1	K-1
3638	57-V	A	2	1	K-1
3641	57-V	A	2	•	K-1
3642	57-V	A,D	2	1	K-1
3644	57-V	A,D	2	1	K-1
3646	57-V	A,D			
3648	57-V		2	1	K-1
3701	57-V	A,D	2	1	K-1
3701	57-V	A,D	2	1	K-1
3702	57-V 57-V	A,D	2	1	K-1
3703 3706		A,D	2	1	K-1
	57-V	A,D	2	1	K-1
3707	57-V	A,D	2	1	K-1
3710	57-V	A,D	2	1	K-1
3711	57-V	A,D	2	1	K-1
3716	57-V	A,D	2	1	K-1
3717	57-V	A,D	2	1	K-1
3721	57-V	A,D	2	1	K-1
3722	57-V	A,D	2	1	K-1
3801	57-V	A,D	2	1	K-1
3802	57-V	A,D	2	1	K-1
3803	57-V	A,D	2	1	K-1
3805	57-V	Α	2	1	K-1
3806	57-V	A,D	2	1	K-1
3809	57-V	A,D	2	1	K-1
3810	57-V	Ε '	2	1	K-1
3812	57-V	A,D	2	1	K-1
3814	57-V	A,D	2	1	K-1
3815	57-V	A,D	2	1	K-1
3817	57-V	A,D	2	1	K-1
3430	57-VI	A,B,C,D	3	2	K-1
3608	57-VI	A,B,C,D	3	2	K-1
3704	57-VI	A,B,C,D	3	2	K-1
3713	57-VI	A,B,C,D	3	2	K-1
3720	57-VI	A,B,C,D	3	2	K-1
3807	57-VI	A,B,C,D	3	2	K-1
3900	57-VII	A A	2	1	
3904	57-VII	Ä	2		K-1
3905	57-VII	Ē	2	1	K-1
3913	57-VII		2	1	K-1
3914		A		1	K-1
3914	57-VII	E	2	1	K-1
	57-VII	A	2	1	K-1
3900	57-VIII	B,C,D,E	3	2	K-1
3904	57-VIII	B,C.D,E	3	2	K-1
3905	57-VIII	A,B,C,D	3	2	K-1
3913	57-VIII	B,C.D,E	3	2	K-1

BUILDING	TYPE	APARTMENT	BORMS	STORIES	AREA
3914	57-VIII	A,B,C,D	3	2	K-1
3916	57-VIII	B,C.D,E	3	2	K-1
3917	60-1	A,B,C,D	2	2	K-1
3924	60-1	A,B,C,D	2	2	K-1
3934	60-1	A,B,C,D	2	2	K-1
3935	60-1	A,B,C,D	2	2	K-1
3941	60-1	A,B,C,D	2	2	K-1
3922	60-11	A,B,C,D	4	2	K-1
3933	60-11	A,B,C,D	4	2	K-1
3936	60-11	A,B,C,D	4	2	K-1
3939	60-11	A,B,C,D	4	2	K-1
3918	60-111	A,B,C,D	3	2	K-1
3919	60-111	A,B,C,D	3	2	K-1
3920	60-111	A,B,C,D	3	2	K-1
3921	60-111	A,B,C,D	3	2	K-1
3923	60-111	A,B,C,D	3	` 2	K-1
3925	60-111	A,B,C,D	3	2	K-1
3926	60-111	A,B,C,D	3	2	K-1
3927	60-111	A,B,C,D	3	2	K-1
3928	60-111	A,B,C,D	3	2	K-1
3929	60-111	A,B,C,D	3	2	K-1
3930	60-111	A,B,C,D	3	2	K-1
3931	60-111	A,B,C,D	3	2	K-1
3932	60-111	A,B,C,D	3	2	K-1
3937	60-111	A,B,C,D	3	2	K-1
3938	60-111	A,B,C,D	3	2	K-1
3940	60-111	A,B,C,D	3	2	K-1
3942	60-111	A,B,C,D	3	2	K-1
3943	60-111	A,B,C,D	3	2	K-1
3945	60-111	A.B.C.D	3	2	K-1

ANNEX C

REQUIRED DD FORM 1391 DATA

To facilitate ECIP project approval, the following supplemental data shall be provided:

- a. In title block clearly identify projects as "ECIP."
- b. Complete description of each item of work to be accomplished including quantity, square footage, etc.
- c. A comprehensive list of buildings, zones, or areas including building numbers, square foot floor area, designated temporary or permanent, and usage (administration, patient treatment, etc.).
- d. List references, and assumptions, and provide calculations to support dollar and energy savings, and indicate any added costs.
- (1) If a specific building, zone, or area is used for sample calculations, identify building, zone or area, category, orientation, square cotage, floor area, window and wall area for each exposure.
 - (2) Identify weather data source.
- (3) Identify infiltration assumptions before and after improvements.
- (4) Include source of expertise and demonstrate savings claimed. Identify any special or critical environmental conditions such as pressure relationships, exhaust or outside air quantities, temperatures, humidity, etc.
- e. Claims for boiler efficiency improvements must identify data to support present properly adjusted boiler operation and future expected efficiency. If full replacement of boilers is indicated, explain rejection of alternatives such as replace burners, nonfunctioning controls, etc. Assessment of the complete existing installation is required to make accurate determinations of required retrofit actions.
- f. Lighting retrofit projects must identify number and type of ixtures, and wattage of each fixture being deleted and installed. New

- lighting shall be only of the level to meet current criteria. Lamp changes in existing fixtures is not considered an ECIP type project.
- g. An ECIP life cycle cost analysis summary sheet as shown in the ECIP Guidance shall be provided for the complete project and for each discrete part included in the project. The SIR is applicable to all segments of the project. Supporting documentation consisting of basic engineering and economic calculations showing how savings were determined shall be included.
- h. The DD Form 1391 face sheet shall include, for the complete project, the annual dollar and MBTU savings, SIR, simple amortization period and a statement attesting that all buildings and retrofit actions will be in active use throughout the amortization period.
- i. The calendar year in which the cost was calculated shall be clearly shown on the DD Form 1391.
- j. For each temporary building included in a project, separate documentation is required showing (1) a minimum 10-year continuing need, based on the installation's annual real property utilization survey, for active building retention after retrofit, (2) the specific retrofit action applicable and (3) an economic analysis supporting the specific retrofit.
- k. Nonappropriated funded facilities will not be included in an ECIP project without an accompanying statement certifying that utility costs are not reimbursable.
- I. Any requirements required by ECIP guidance dated 25 April 1988 and any revisions thereto. Note that unescalated costs/savings are to be used in the economic analyses.
- m. The five digit category number for all ECIP projects except for Family Housing is 80000. The category code number for Family Housing projects is 71100.

ANNEX D

EXECUTIVE SUMMARY GUIDELINE

- 1. Introduction.
- 2. Building Data (types, number of similar buildings, sizes, etc.)
- 3. Present Energy Consumption.
 - o Total Annual Energy Used.
 - o Source Energy Consumption.

Electricity - KWH, Dollars, BTU
Fuel Oil - GALS, Dollars, BTU
Natural Gas - THERMS, Dollars, BTU
Propane - GALS, Dollars, BTU
Other - QTY, Dollars, BTU

- o Energy Consumption of the buildings in this study as compared to the basewide consumption.
- 4. Historical Energy Consumption.
- 5. Reevaluated Projects Results.
- 6. Energy Conservation Analysis.
 - o ECOs Investigated.
 - o ECOs Recommended.
 - o ECOs Rejected. (Provide economics or reasons)
 - o ECIP Projects Developed. (Provide list)*
 - o Non-ECIP Projects Developed. (Provide list)*
 - o Operational or Policy Change Recommendations.

- Include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date. For all programmed projects also include the year in which it is programmed and the programmed year cost.
- 7. Energy and Cost Savings.
 - o Total Potential Energy and Cost Savings.
 - o Percentage of Energy Conserved.
 - o Energy Use and Cost Before and After the Energy Conservation Opportunities are Implemented.
- 8. Energy Plan.
 - o Project Breakouts with Total Cost and SIR.
 - o Schedule of Energy Conservation Project Implementation

APPENDIX C-2
ELECTRICAL BILLS



ofield Barracks Family Housing Reimbursements

i,CY :	Aug-89	FY:	89								
blic H	lousing 1970	& After (C	Cat N)		222222				===	2222	
	Units Metered	Reading No.	KWH-Meas or Est.		Factor /Mtrd units	Billing) Qty (KWH)	KWH/ Unit	_			
	208 208	Estimate 11	269152 219600	215 300			1294 1056				
	497	16	761400	500 640			1532				
				Total Cat	(N) ******	* 1575416	KMH X	0.06927	=	\$\$\$	109129.07
blic H	lousing 1950	-1969 - (Ca	it X) - Schi	ofield Barr	acks	`		(Rate A-FDA)			
	Units Metered	Reading No.	KWH-Meas or Est.	Adj.	Factor	Billing Qty (KWH)	KWH/ Unit				
Area	112	* 12	113680				1015	-			
Area	320 324	18 4	412800 165600				1290 739			r	
Area	224 492	Estimate	519060				1055			·	
otai	1148		1211140	2140	/1148	2257700	1055				
				Sub-total	1 Cat (X)	: 2257700	KWH X	0.06927 (Rate A-FDA)	=	\$\$\$	156390.BE
ation	Units Metered	KWH/Unit (Est)	Billing Oty(KWH)	Rate A (FDA)	Cost (\$)						
ano	32	1055	33760	0.06927	2338.56)		-			
				Sub-total	2 Cat (X)	: 33760	KWH, \$	2338.56			
				Total Cat	(X) ******	÷ 2291460	KWH, \$	158729.44			
:her Pi	ublic Housin	ng (Cat Y)									
	1161	K₩H/Unit	(Est) X	283	Units =	326241	X Rate A (FDA)	0.06927	=	\$\$	22598.7
ıb-Sta	ndard Housin	ng - KMC (C.	at <i>I</i>)								
	900	KWH/Unit	(Est) X	ě	5 Units =	5400	X Rate A (FDA)	0.07589	=	\$\$	
		*********		SB Family SB FH w/o		4198517 4193117		2		* :	

Schofield Barracks Electric Meter Readings - Sheet 1

Location	Reading No.	Meter No.	Present Reading	Previous Reading	Mult. Factor	Computed Consump. (KWH)	Interval Between Readings (Days)	KWH Per 30.4 Days	KWH Per 30.4 Days Last Month	diff (%)
100 Area Nr Bldg 111	1	2045	3281	2983	120	35760	28	38,825	28,424	36.6
300 Area Nr Bldg 321	2	8896	3205	1926	10	12790	28	13,886	12,046	15.3
1300 Area Nr Bldg 1320	3	6219	5117	4990	1800	228600 -	28	248,194	230,280	7.8
1400 Area Nr Bldg 1320	4	154	8959	8787	1200	206400	28	224,091	209,760	6.8
SB Substation-Ckt 20	5	900	٥	0	2771	0	28	. 0	. 0	0.0
SB Substation-Ckt 21	6	651	981	504	2771	1321767	28	1,435,061	1,769,006	-18.9
SB Substation-Main	7	6184	8874	8555 "	32000	10208000		11,082,971		0.9
Solomon School	8	4729	8979	8821	160	25280	28	27,447	10,741	155.5
Solomon School	9	7529	3447	3373	40	2960	28		2,128	51.0
1300 Area Nr Bldg 1370	10	8897	6370	5330	10	10400	28	•	10,817	4.4
1900 Area Nr Blog 1983	11	145	4223	4002	1200	265200	28		278,160	3.5
3000 Area Nr Blog 3930	12	147	2230	2165	1200	78000	28		95,760	-11.6
Area I UH Welding Shop	13	1879	3818	2777	1	1041	28	1,130	1,078	4.8
Area I UH Welding Shop	14	3470	588	587	100	100	28	109	ಮ	-82.8
O Area Nr Bldg T-822	15	6979	1637	1543	160	15040	28	16,329	15,808	3.3
000 Area Nr Ofc Club	16	6218	8830	8314	1800	928800	28	1,008,411	964,440	4.6
Helemano Mil Res	17	8177	2984	2884	1000	100000	, 28	108,571	130,467	-16.8
3000 Area Nr Bldg 3611	18	6223	5308	4870	1200	525600	28	570,651	522,880	9.1
Commissary	19	1514	4271	4047	1200	268800	28	291,840	304,000	-4.0
First Hawaiian Bank	20	1545	6818	6630	40	7520	28	8,165	7,397	10.4
SB Sewage Trimt Plant	21	7178	2097	1617	600	288000	28	312,686	173,280	80.5
WAFB Aviation Fac	22	4193	1889	1663	60	13560	28	14,722	18,696	-21.3
South Ramp WAFB	23	4734	95410	95354	1	56	28	61	171	-64.3
SFTS WAFB	24	807	7678	7208	80	37600	28	40,823	42,864	-4.8
SFTS WAFB	25	676	6176	5875	1	301	28	327	367	-10.9
Bldg 114 WAFB	26	3782	437	. 433	1	4	28	4	11	-ಟ.6
Машла Кари	27	5041	6045	5407	1	828	26		1,388	-46.3
QUAD A	28	6971	10010	9258	240	180480	28			-3.4
QUAD A	29	8004	10207	9714	160	78880	26		80,053	
Helemano, Bldg 300	30	2566	10008	9999	200	1800	28			-3.6
Kunia Tunnel	31	6611	1490	1200	4000	1160000	28			2.7
Area X	32	4550	808	781	1200	32400	28			-7.4
Bldg T-300, WAFB	33	6093	2162	2153	120	1080	28	•	•	
Bldg 1020,WAFB	34	8619	9641	9612	120	3480	28	3,778	3,496	8.1

Barracks Family Housing Reimbursements

:	Sep-89	FY:	89							
Hou	sing 1970	& After (C	at N)		***********	********	=======================================	:==:		
	Units Metered	Reading No.	KWH-Meas or Est.	Adj. Factor (Tot units/Mtrd units)	Billing Qty (KWH)	K₩H/ Unit				
-	208 208 497	Estimate 11 16	326976 265200 928800	215 208 300 208 640 497	337980 382500 1196040	1572 1275 1869				
				Total Cat (N) ********	1916520	KWH X	0.06632	=	\$\$\$	127103.61
Hou	sing 1950	-1969 - (Ca	it X) - Scho	ofield Barracks			(Rate A-FOA)			
	Units Metered	Reading No.	KWH-Meas or Est.	Adj. Factor	Billing Oty (KWH)	KWH/ Unit				
	112 320 224 492	* 12 18 4 Estimate	143584 525600 206400 656688			1282 1643 921 1335				•
	1148		1532272	2140 /1148	2856326	1335				
				Sub-total 1 Cat (X)	2856326	KWH X	0.06632 (Rate A-FDA)	=	\$\$\$	189431.54
	Units Metered	KWH/Unit (Est)	Billing Pty(KWH)	Rate A Cost(\$) (FDA)						
	32	1335	42720	0.06632 2833.19			•			•
				Sub-total 2 Cat (X)	42720	KWH, \$	2833.19			
				Total Cat (X) *******	2899046	KWH, \$	192264.73			
Pub1	ic Housin	ng (Cat Y)								
	1469	K₩H/Unit	(Est) X	281 Units =	412789	X Rate A (FOA)	0.06632	=	\$\$\$	27376.17
anda	ard Housin	ng - KMC (C	at 7)	····						
4	900	K₩H/Unit	(Est) X	6 Units =		X Rate A (FOA)	0.07365	=	\$\$\$	397.71
			Total	SB Family Housing SB FH w/o KMC	5233755 5228355	:======		* *	+ \$ + \$	

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Schofield Barracks Family Housing Reimbursements

8 F. Month, CY : Oct-89

1. Public Housing 1970 & After (Cat N)

	Units Metered	Reading No.	Ź	M-Meas Adj. Factor Billing or Est. (Tot units/Mtrd units) aty (KWH)	nits) Ol	Billing ty (KWH)	KWH/ Unit			
FY71 FY72 FY73	208 208 497	Estimate 11 16	428688 435600 1008000	215 300 640	208 208 497	443115 628269 1298028	2061 2094 2028			
			-	Total Cat (N) *******	*	2369412	KWH X	0.06754 =	\$\$\$	160030.09
2. Public Housing		-1969 - (Ca	t X) - Schof	1950-1969 · (Cat X) · Schofield Barracks				(Rate A-FOA)		
	Units Metered	Reading No.	KVH-Meas or Est.	Adj. Factor	~ ŏ	Billing Oty (KVH)	KVH/ Unit		`	
3000 Area 3000 Area 1400 Area 1300+1400	112 320 224 224	* 12 18 4 Ectimate	163 856 619200 222000 753702		: ! !	1 1 1 1 1 1 1	1463			
Sub-Total	1148		1758848	2140 /1148		3278689	1532			
			s	Sub-total ·1 Cat (X)	 ©	3278689	X HAX	0.06754 = (Rate A-FOA)	\$\$\$	221442.66
Location	Units Metered	KWH/Unit (Est)	Billing Oty(KWH)	Rate A Cost(\$)	Ç.					

3311.08 49024 KUH, \$ Sub-total 2 Cat (X) :

0.06754 3311.08

45054

1532

32

неГетапо

Total Cat (X) ******* 3327713 KWH, \$ 224753.74

Housing - KMC (Cat 2) 4. Sub-Sta

900 KWH/Unit (Est) X

6 Units =

5400 X Rate A (FOA)

= \$5\$ 0.07396

399.38

* \$ **

6176010 6170610

Total SB Family Housing

Total SB FH W/o KMC

ERR 417162.39 416763.01

AV1-BB40

;; 0ct-89 Month, CY:

8

Energy Consumption Location

MBTU(30.4 day)

Ft. Shafter

18751 AMR bill & interval 6506 FS rdg 1,8

8778 FSrdg 14,15

Aliamanu MR Tripler AMC

Kunia

5028 a-85,95,FS rdg 8 & GUAD A

32383 corrected for quad A

Schofield Bks

Others

3893 see below

70311 Above - less kunia

TOTAL

Others Breakout

ft. DeRussy

Helemano MR

910 FS rdg 26,29,30

0 not used 596 SB rdg 21 390 SB rdg 17 Waiawa MR - sold to State of HI

143 fixed estimate

367 HELCO 5111 704 FS rdg 19

Kapalama

X.HC

Ft. Kam

55 fixed estimate 405 MELCO 5111

215 List#2(SB+FS)-WARC-DDS-FR 108 bill A-25

-DMR+1600(DMR est) unadjusted data (30.4 Days) 3893 TOTAL

family Housing

Miscellaneous

Vaianae ARC

Cannon Club

Facilities Energy Consumption Report

	ENTER MONTH (NUMERIC):		Ξ	11 ENTER CY (NUMERIC, YY):	4ERIC, YY):	89		32813		
Schofield Barracks Electric Meter Readings -	tric Meter R		Sheet 1							
	į			-				e •	ry FY)	0.06759
Month, UT: Nov-89 Read'g dte:	:• 	0661		MECO fuel oil rate HELCO fuel oil rate	rate : ilrate :	-0.02661		Rate A : Rate B :	0.09420	<u>,</u>
Location	Reading	Keter	Present	Previous	Mul t.	Computed	Interval	KWH Per	KWH Per	diff
	. o	No.	Reading	Reading	Factor	Consumb.	Between	30,4	30.4	(%)
						(KWH)	Readings	Days	Days	
							(Days)		Last Month	
100 Area Nr Bldg 111		1 2045	3707	3440	120	32040	34	28,648	17,577	63.0
300 Area Nr Bldg 321	7	9888	6239	4828	10	17110	34	15,298	14,951	2.3
1300 Area Nr Bldg 1320	~	6219	5380	5254	1800	226800	34	202,786	227,171	-10.7
1400 Area Nr Bldg 1320	7	154	9351	9144	1200	248400	34	222,099	504,509	8.6
SB Substation-Ckt 20	'n	006	0	0	1775	0	34	0	0	0.0
SB Substation-Ckt 21	9	651	2015	1547	2771	1296828		1,159,517	1,444,816	-19.7
SB Substation-Main	_	6184	9621	2572	32000	11968000		10,700,800	10,995,588	-2.7
Solomon School	ಐ	4729	9327	8173	160	24640	34	22,031	28,594	-23.0
Solomon School	٠ ;	7529	3622	3536	07	3440	* i	3,076	3,280	-6.2
1500 Area Nr Bldg 1370	<u>0</u> ;	8897	8938	7654	9	12840	34	11,480	11,828	-2.9
1900 Area Nr Bldg 1983 3000 Area Nr Bldg 2020	= :	145	4754	4586	1200	201600	37	180,254	401,280	-55.1
Area I UN Welding Shop	3 5	1879	2488	2767	907	541	4 4	700,001	1.040	-53.5
Area I UH Welding Shop	1 2	3470	601	594	100	200	34	929	553	13.2
800 Area Nr Bldg T-822	15	6269	1868	1740	160	20480	34	18,312	15,182	20.6
9000 Area Nr Ofc Club	16	6218	9905	9390	1800	927000	34	828,847	928,582	-10.7
Helemano Mil Res	17	8177	3240	3108	1000	132000	34	118,024	114,230	3.3
3000 Area Nr Bldg 3611	18	6223	6365	5854	1200	649200	34	580,461	570,415	1.8
Commissary	19	1514	4813	4538	1200	330000	34	595,059	295, 156	0.0
First Hawaiian Bank	20	1545	7226	7028	07	7920	34	7,081	7,738	-8.5
SB Sewage Irtmt Plant	21	7178	2853	2413	009	264000	34	236,047	174,662	35.1
WAFB Aviation Fac	22	4193	2504	2238	9	15960	34	14,270	19,290	-56.0
South Ramp WAFB	23	4734	95589	95502	-	87	34	78	85	-8.2
SFTS WAFB	57	807	8790	8245	80	43600	34	38,984	41,786	-6.7
SFTS WAFB	25	929	2769	9229	-	387	34	346	349	-0.9
Bldg 114 WAFB	56	3782	448	277	-	2	34	7	9	-33.3
Mauna Kapu	27	5041	2478	16791	-	289	34	919	189	-10.6
OUAD A	28	6971	1825	916	240	218160	34	195,061	200,308	-2.6

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Schofield Barracks family Housing Reimbursements

Month, CY : Nov-89 FY: 1990

1. Public Housing 1970 & After (Cat N)

		120928.38					236659.96	
		\$ \$,				\$ \$	
		0.06759	(Rate A-FOA)				0.06759 (Rate A-FOA)	
KWH/ Unit	1417 969 1865	кин х		KWK/ Unit	1569 2029 1109 1636	1636	X X X	
Billing Oty (KWH)	304655 290769 1193722	1789146		Billing Oty (KWH)		3501405	3501405	
NH-Meas Adj. Factor Billing or Est. (Tot units/Mtrd units) Oty (KUH)	208 208 497	Total Cat (N) *******	cks	Adj. Factor		2140 /1148	Cat (X) :	Cost(\$)
Adj. (Tot units/	215 300 640	Total Cat (field Barra	Adj.		2140	Sub-total 1 Cat (X)	Rate A
\$	294736 201600 927000		t X) - Scho	KWH-Meas or Est.	175728 649200 248400 804996	1878324		Billing
Reading No.	Estimate 11 16		-1969 - (Ca	Reading No.	* 12 18 4 Estimate			KWH/Unit
Units Metered	208 208 497	, , , , ,	2. Public Housing 1950-1969 - (Cat X) - Schofield Barracks	Units Metered	112 320 224 492	1148		Units
	FY71 FY72 FY73	0 0 0 1 1 1 1	2. Public H		3000 Area 3000 Area 1400 Area 1300+1400	Sub-Total		Location

(FOA)

Oty(KWH)

(Est)

Metered

								ERR	
				34187.02		405.22		395313.83	
				\$\$\$		\$\$	ii	**	•
				11		H			
	3538.47	240198.43		0.06759 = \$\$\$		0.07504 = \$\$\$	## ## ## ## ## ## ## ##		
	•		:	te A (FOA)	:	te A (F0A)	H H H H:		
	52352 KWH,	KWH,	• • • •	505800 X Rate A (FOA)		5400 X Rate A (FOA)			
		3553757 KWH, \$	6 6 8 4 4 6 8	505800	KMC (Cat Z)	2400	5854103	5848703	
25	••	*					# !!		
3538.47	S	* *	! • •	ts "	:	t s	ii 60	,	
	Cat	8		281 Units =	:	6 Units =	iner:	æ	
0.06759	tal 3	Cat (281	į	9	:::::: i(\lambda)	0/1	
0.0	Sub-total 2 Cat (X) :	Total Cat (X) *******	:		:		Fam	Ξ	
25	Su	٥	1 1 5 1 4 5 6 6 7 1 1 1 6 6 7				reservations reservations Total SB Family Housing	Total SB FH W/o KMC	
25225				t X		ς ×	Tota	Tota	
			:	1800 KWH/Unit (Est) X	KMC (Cat 2)	900 KWH/Unit (Est) X	# #		
1636			Cat Y)	ni t	3	ni t	:: ::		
				U/H/U	! !	CVH/V			
32			using	000	using	00			
oue			3. Other Public Housing	₹	4. Sub-Standard Housing	•			
Helemano			3. oth		4. Sut		ii 11 11		

		,									
	Ž	9			•			(update every FY)	ry FY)		1167
Montn,tY : Dec-89 Read'g dte:	 -	0661		MECO fuel oil rate MELCO fuel oil rate	rate : il rate :	.0.02503 -0.01662		Rate A : Rate B :	0.09420		9
l ocat ion	Reading No.	Meter No.	Present Reading	Previous Reading	Mult. Factor	Computed Consump. (KWH)	Interval Between Readings	KWH Per 30.4 Days	KWH Per 30.4 Days	diff (%)	
			H		# # # # # # # # # # # # # # # # # # #		11 6 11 6 11 6 11 6				
300 Area Nr 81dg 321	- ~	8896	7997	57U7 6539	120	14580	\$ \$	15,284	15, 298	6.5	
1300 Area Nr Bldg 1320	m	6219	2495	5380	1800	201600	: 8	211,332	202,786	4.2	
1400 Area Nr Bldg 1320	7	154	9537	9351	1200	223200	82	233,975	222,099	5.3	
SB Substation-Ckt 20	2	006	0	0	1773	0	8			0.0	
SB Substation-Ckt 21	9	651	2564	2015	1775	1521279	62	1,594,720	1,159,517	37.5	
SB Substation-Main	7	6184	9923	1296	32000	9664000	62	29 10,130,538	10,700,800	-5.3	
Solomon School	8	4259	9412	9327	160	13600	62	14,257	22,031	-35.3	
Solomon School	٥	7529	3680	3622	07	2320	62	2,432	3,076	-20.9	
1300 Area Nr Bldg 1370	10	8897	10011	8938	10	10730	82	11,248	11,480	-2.0	
1900 Area Nr Bldg 1983	Ξ	145	7867	7527	1200	276000	\$	289,324	180,254	60.5	
3000 Area Nr Bldg 3930	12	147	2515	2428	1200	104400	62	109,440	103,002	6.3	
Area 1 UK Welding Shop	13	1879	2999	2488	-	1159	82	1,215	787	151.0	
Area 1 UK Welding Shop	14	3470	909	109	100	300	8	314	929	8.67-	
800 Area Nr Bldg 1-822	15	6269	1980	1868	160	17920	62	18,785	18,312	5.6	
9000 Area Nr Ofc Club	16	6218	10365	9905	1800	828000	62	867,972	828,847	4.7	
Helemano Mil Res	17	8177	3349	3240	1000	109000	8	114,262	118,024	-3.2	
3000 Area Nr Bldg 3611	18	6223	6848	6365	1200	279600	62	607,581	580,461	4.7	
Commissary	19	1514	5041	4813	1200	273600	62	286,808	295,059	-2.8	
First Kawaiian Bank	20	1545	7398	7226	0,7	9889	8	7,212	7,081	1.9	
SB Sewage Irtmt Plant	12	7178	3230	2853	900	226200	\$2	237,120	236,047	0.5	
WAFB Aviation Fac	22	4193	5692	2504	09	11460	\$	12,013	14,270	-15.8	
South Ramp WAFB	23	7227	95664	95589	-	23	53	62	78	1.3	
SFTS WAFB	54	807	9214	8790	80	33920	62	35,558	38,984	-8.8	
SFTS WAFB	25	929	7281	6942	-	339	62	355	346	5.6	
Bldg 114 WAFB	92	3782	451	448	-	٣	82	3	7	-25.0	
Mauna Kapu	27	5041	8092	7478	-	614	62	779	614	6.4	
OUAD A	28	6971	2586	1825	240	182640	\$	191 457	105 061	۲.	
					,		ì			• •	

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Schofield Barracks Family Housing Reimbursements

Month, CY : Dec-89 FY: 1990

1. Public Housing 1970 & After (Cat N)

		123549.31							
*		* \$55							
		0.06917	(Rate A-FOA)						
KWH/ Unit	1497 1327 1666	KWH X		KWH/ Unit	1404	1811	966	1463	1463
Billing Oty (KWH)	321855 398077 1066237	1786169		Billing Oty (KWH)	• • • • • • • • • • • • • • • • • • •				3131864
M-Meas Adj. Factor Billing or Est. (Tot units/Mtrd units) Gty (KWH)	215 208 300 208 640 497	Total Cat (N) *******	2. Public Housing 1950-1969 · (Cat X) · Schofield Barracks	Adj. Factor	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				2140 /1148
KVH-Meas or Est. (T	311376 276000 828000	10	X) - Schofi	KWH·Meas or Est.	157248	579600	223200	720036	1680084
Reading KWH-Meas No. or Est	Estimate 11 16		1969 · (Cat	Reading No.	* 12	18	7	Estimate	
Units Metered	208 208 497		vusing 1950-	Units Metered	112	320	554	765	1148
	FY71 FY72 FY73		2. Public Ho		3000 Area	3000 Area	1400 Area	1300+1400	Sub-Total

216631.03

0.06917 = \$\$\$

KWH X

Sub-total 1 Cat (X) : 3131864

(Rate A-FOA)

3238.26	219869.29	
	•	
KU	KWH,	
46816	3178680	
Sub-total 2 Cat (X) :	Total Cat (X) ******* 3178680 KWH, \$ 219869.29	•
		3. Other Public Housing (Cat Y)

31273.76

\$38 = 0.06917 452129 X Rate A (FOA) 281 Units = 1609 KWH/Unit (Est) X 4. Sub-Standard Housing - KMC (Cat 2)

ERR 374692.36 418.93 375111.29 * ** \$\$\$ = 0.07758 5400 X Rate A (FOA) 5422378 5416978 6 Units = Total SB Family Housing Total SB FH W/o KMC 900 KWH/Unit (Est) X

91

74,00,40

2000

20.50

ş

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		,								
		•						(update every FY)	ry FY)	1
Month,CY : Jan-90 Read'g dte:	FY:	1990		MECO fuel oil rate HELCO fuel oil rate	rate : l rate :	-0.02331		Rate A :	0.09420	0.07087
Location	Reading	Heter	Present	Previous	Mult.	Computed	Interval	KWH Per	KWH Per	diff
	No.	NO.	Reading	Reading	Factor	Consump.	Between	30.4	30.4	(%)
						(KWH)	Readings	Days	Days	
							(Days)		Last Month	
100 Area Wr 81dg 111		2045	45 4149 3954	3954	120	23400	54	29,640	31,071 -4.6	9.7-
300 Area Nr Bldg 321	2	8896	9178	1997	5	11810	77	14,959	15,284	-2.1
1300 Area Nr Bldg 1320	m	6219	2609	2675	1800	210600	54	266,760	211,332	26.2
1400 Area Nr Bldg 1320	7	154	9681	9537	1200	172800	57	218,880	233,975	-6.5
SB Substation-Ckt 20	2	006	0	0	2771	0	57	0	0	0.0
SB Substation-Ckt 21	9	651	2963	2564	2771	1105629	57	1,400,463	1,594,720	-12.2
SB Substation-Main	7	6184	10194	9923	32000	8672000	57	10,984,533	10,130,538	8.4
Solomon School	8	4729	9513	9412	160	16160	54	20,469	14,257	43.6
Solomon School	٥	7529	3735	3680	70	2200	77	2,787	2,432	14.6
1300 Area Nr Bldg 1370	10	8897	076	11	10	0626	72	11,767	11,248	9.4
1900 Area Nr Bldg 1983	11	145	5177	7867	1200	231600	57	293,360	289,324	1.4
3000 Area Nr 81dg 3930	12	147	2587	2515	1200	86400	54	109,440	109,440	0.0
Area I UK Welding Shop	13	1879	1164	2799	-	1117	57	1,415	1,215	16.5
Area I UK Welding Shop	14	3470	209	709	100	300	57	380	314	21.0
800 Area Nr Bldg 1-822	15	6269	2060	1980	160	12800	57	16,213	18,785	-13.7
9000 Area Wr Ofc Club	16	6218	847	365	1800	867600	57	1,098,960	867,972	26.6
Helemano Mil Res	17	8177	3446	3349	1000	00026	57	122,867	114,262	7.5
3000 Area Nr Bldg 3611	18	6223	7255	6848	1200	488400	57	618,640	607,581	1.8
Commissary	19	1514	5237	5041	1200	235200	57	297,920	286,808	3.9
First Kawaiian Bank	20	1545	7341	7169	07	6880	57	8,715	7,212	20.8
SB Sewage Irtmt Plant	21	7178	3550	3230	009	192000	54	243,200	237,120	2.6
WAFB Aviation Fac	22	4193	2910	2692	09	12900	72	16,340	12,013	36.0
South Ramp WAFB	23	7227	95725	95664	-	61	54	77	29	-2.5
SFTS WAFB	54	807	9594	9214	80	30400	57	38,507	35,558	8.3
SFTS WAFB	25	929	7586	7281	-	305	57	386	355	8.7
Bldg 114 WAFB	56	3782	424	451	•	٣	57	7	3	33.3
Mauna Kapu	27	5041	0	8092		0	57	0	949	.100.0
QUAD A	28	6971	3233	2586	540	155280	57	196,688	191,457	2.7
		, ,								

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Schofield Barracks Family Housing Reimbursements

Honth, CY : Jan-90 FY:

1990

1. Public Housing 1970 & After (Cat N)

Units	Reading No.	\$;	W-Meas Adj. Factor Billing or Est. (Tot units/Mtrd units) Oty (KWH)	actor trd units)	Billing Oty (KWH)	KWH/ Unit		
	Estimate 11 16	297440 231600 867600	215 300 640	208 208 497	307450 334038 1117231	1430 1113 1746		
		-	Total Cat (N) ******	******* (1758719	KWH X	0.07089 = \$\$\$	124675.59
	1969 - (Ce	st X) - Scho	2. Public Housing 1950-1969 - (Cat X) · Schofield Barracks	ks			(Rate A-FOA)	
	Reading No.	KWH-Meas or Est.	Adj. Factor	actor	Billing Oty (KWH)	KWH/ Unit		
	* 12	128688	6 1 1 1 1 1 1	, , , , , ,	1	1149		
	18	488400				1526		
	Estimate	592416				1204		
		1382304	2140 /1148	1148	2576769	1204		
		v.	Sub-total 1 Cat (X)	Cat (X) :	2576769	х них	0.07089 = \$\$\$ (Rate A-FOA)	182667.15
	KWH/Unit (Est)	Billing Oty(KWH)	Rate A (FOA)	Cost(\$)				
	1204	38528	0.07089	2731.25				

Total Cat (X) ******* 2615297 KUH, \$ 185398.40

2731.25

¥,

38528 KWH,

Sub-total 2 Cat (X) :

				٠		~		(update every FY)	rv FY	
Month, CY: Feb-90	FY:	1990		HECO fuel oil rate	rate :			Rate A :	0.09420	
Read'g dte:			_	HELCO fuel oil rate	l rate :			Rate B :	0.09926	
Location	Reading	Meter	Present	Previous	Mult.	Computed	Interval	KWH Per	KWH Per	diff
	No.	No.	Reading	Reading	Factor	Consump.	Between	30.4	30.4	8
						(KWH)	Readings (Oays)	Days	Days Lest Month	
100 Area Nr Bldg 111		2045	5077	0717	120	30720		30 125	079 02	1 6
300 Area Nr Bldg 321	2	9688	10711	9178	10	15330	. F	15.033	14,959	0.5
1300 Area Nr Bldg 1320	2	6219	5757	5609	1800	266400	31	261,244	266,760	'
1400 Area Nr Bldg 1320	7	154	9889	9681	1200	249600	31	544,769	218,880	11.8
SB Substation-Ckt 20	.∨	006	867	0	2771	1379958	31	1,353,249	0	0.0
SB Substation-Ckt 21	9	651	5964	2963	2771	2771	31	2,717	1,400,463	-99.8
SB Substation-Main	7	6184	10531	10194	32000	10784000	31	10,575,277	10,984,533	-3.7
Solomon School	ဆ	4729	9640	9513	160	20320	31	19,927	50,469	-2.6
Solomon School	٥	7529	3797	3735	07	2480	31	2,432	2,787	-12.7
1300 Area Nr Bldg 1370	10	8897	2233	076	10	12930	31	12,680	11,767	7.8
1900 Area Nr Bldg 1983	11	145	5418	5177	1200	289200	31	283,603	293,360	-3.3
3000 Area Nr Bldg 3930	12	147	2681	2587	1200	112800	31	110,617	109,440	1.1
Area I UH Welding Shop	13	1879	9589	1164	-	1825	31	1,790	1,415	26.5
Area I UH Welding Shop	14	3470	613	209	100	009	31	588	380	54.7
800 Area Nr Bldg T-822	5	6269	2181	2060	160	19360	31	18,985	16,213	17.1
9000 Area Nr Ofc Club	16	6218	1457	847	1800	1098000	31	1,076,748	1,098,960	-2.0
Helemano Mil Res	17	8177	3571	3446	1000	125000	31	122,581	122,867	-0.2
3000 Area Nr Bldg 3611	18	6223	7777	7255	1200	626400	31	614,276	618,640	-0.7
Commissary	19	1514	2675	5237	1200	306000	31	300,077	297,920	7.0
First Kawaiian Bank	20	1545	7672	7341	07	6120	31	700'9	8,715	-31.1
SB Sewage Irtmt Plant	21	7178	3935	3550	009	231000	31	556,529	243,200	6.9-
WAFB Aviation Fac	22	4193	3126	2910	9	12960	31	12,709	16,340	-22.2
South Ramp WAFB	23	4734	95803	95725	-	78	31	76	77	-1.3
SFTS WAFB	54	807	10005	626	80	32880	31	32,244	38,507	-16.3
SFTS WAFB	52	929	7922	7586	-	336	31	329	386	-14.8
Bldg 114 WAFB	92	3782	458	454	-	7	31	7	7	0.0
Mauna Kapu	27	5041	0	0	-	0	31	0	0	0.0
OUAD A	6	,								
	9	ر م	4007	3233	240	185760	31	182,165	196,688	7.4

Schofield Barracks Family Housing Reimbursements A48-K101

F. Feb-90 Month, CY: 0.00000 = \$\$\$ 1800 1390 2209 KWH/ Unit KWH X 387000 417115 2218039 Billing or Est. (Tot units/Mtrd units) Qty (KWH) 1413924 Total Cat (N) ******* 208 208 497 Adj. Factor 215 079 289200 374400 1098000 Reading KWH-Meas 1. Public Housing 1970 & After (Cat N) Estimate Units 208 208 208 Metered FY72 FY73 FY71

(Rate A-FOA) 2. Public Housing 1950-1969 - (Cat X) - Schofield Barracks

0.00

1958 1598 1114 Unit KWH/ oty (KWH) Billing Adj. Factor 626400 249600 172032 786024 Reading KWH-Meas or Est. 18 Estimate Š. 112 320 765 224 Units Metered 3000 Area 3000 Area 1400 Area 1300+1400

0,0000 KWH X 3418885 Sub-total 1 Cat (X)

(Rate A-FOA)

0.00

\$\$\$ =

1598

3418885

2140 /1148

1834056

1148

Sub-Total

0.00 Cost(\$) 0,00000 Rate A (FOA) 51136 Billing Oty(KWH) 1598 KWH/Unit (Est) 32 Metered Units Location Helemano

0.00 44 51136 KWH, Sub-total 2 Cat (X) : Total Cat (X) ******* 3470021 KWH, \$

0.00

Housing - KMC (Cat 2)

0.00 0.00 4 4 1 1 0.00000 = \$\$\$ 5400 X Rate A (FOA) 6187458 6182058 6 Units = Total SB Family Housing Total SB FH w/o KMC 900 KWH/Unit (Est) X

ERR

4. Sub-St

MK32R1 AS OF 12/31/80	12 NO. EMOTHE 12/31/98 12/7/	416H KW 19200.0 70160.6 LDW KW 16640.0 17600.0	CAN 700 6970667		TOTAL KWH 119648000 124928000	TOTAL NET BILL \$ 6289020.44 6989515-72	AVE XWH COST \$ 0.052 0.056	NEW KUM 11ST KWH/KW	SILL PER WO	BAT SU. TULES	\$50668.78 305655.2		504186.48 294733.3	513165-05 348689-7	532207.23 348600.0	542833.91 350000.0	22- 508900.42 348800.0 552.5	516613-12 325161-3		00- 508079.91 334451.6	538246.35 330666.7	504504.68 311466.1	13- 565 880. N 30322. 6 560. 4	604564 84 345365	678541.67 34R000.0	629685.58 358406.0	77- 610690.11 365866.1 >60.0	201137-02 355200-0	576421.81
H1STORY	1988 1959	19200.0 20160.0 16640.0 17600.0	705	341.4	119648500 126978506	6269020.44 . 6989616.22 TDTAI	0.052 0.056 AV	1902 A POUR / INITION OF	FACTOR .	s Abj. s Abj.	25109.99- 6232.13-	1	25950-36 6291.00-	28623.63- 6367.27	29570.20- 4480.33-	31282_34- 4739.75-	24570.20- 4480.33- 347572.22-	28702.42- 6088.39-	28026.12-	29333.26- 6276.45-341445-00	28743.06- 5990.95-	26794-72- 4871-77-	28868-43- 6173-61- 268470.13-	28508-90-4310-53-	31284-39- 4740.06-	4593.76	30922-81- 4685-27- 281881-97-	30297.45- \$308.63-	4083.86-
CUSTOMER CONSUMPTION AND EIT	BUS CODE YEAR TO DATE	7.508	12ER AVG KHR/HJ	RKVAH AVC KHH/KW	385571 10TAL KWH	TOTAL WET BILL'S	AVG KWH COST S	 ENERGY DEMAND ENERGY	CHARGE	S S S S S S S S S S S S S S S S S S S	8854000102900.00	s'o	8992000102020.00 67	10112000108180.00	1045-000107300.00	11200000108180.00		1008000010100.00	9824000105546.00	7	9920000105540.00	ľ	10440030103780.00	1001 60001 06420. 03	11136000110826.00	1015200109065.00	0 114 F F F F F F F F F F F F F F F F F F	10656200112589.00 798970.	0 99640551108, 0.00 750266.24
RUN DA. OB/90 HECD	ACCOUNT MUMBER	s 0 A11 3		FT SHAFTER H1 96050 KWH	CE ADDRESS	1642 WILIKINA DR NULTIFER	·	BILL BILL PUR WEASRO BILL	DAYS FUTE DMD		29 93.0 17280.0	16640.0 18080.	30 93.0 16960.0	29/88 29 90-0 19200.0	29/88 30 90.0 18880.0	32 90.0 19200.0	10/31/88 32 40-0 19200-0 19200-0	31 92.0 19200.0	17/30/86 29 92.0 18560.0 18830.0	31 92.0	30 92.0 18560.0	91.0 17605.0	30 97.0 34740.0	29 90.0 28880.0	32 90.0 19840.0	90.0 19200.0	89 32 90.0 19640.C	30 91.0 20160.0	19520.0

field Barracks Electric Meter Readings - Sheet 1

:h,CY : Jan-89	FY:	89	ŀ	ECO fuel oil	rate :	-0.03291		Rate A :	0.09210	
l'g dte:			i	ÆLCO fuel oi	lrate:	-0.02121		Rate B :	0.09710	
ition	Reading No.	Meter No.	Present Reading	Previous Reading	Mult. Factor	Computed Consump. (KWH)	Interval Between Readings (Days)	KWH Per 30.4 Days	KWH Per 30.4 Days Last Month	diff (%)
					********		Veysi	********	EERCERESSEE	3232272
Area Nr Bldg 111	1	2045	1345	1227	120	14160	16	26,904	28,020	-4.0
Area Nr Bldg 321	2	8896	2573	1829	10	7440	16	14,136	13,887	1.8
3 Area Nr Bldg 1320	3	6219	4114	4048	1800	118800	16	225,720	293,392	-23.1
O Area Nr Bldg 1320	4	154	7578	7485	1200	111600	16	212,040	219,656	-3.5
Substation-Ckt 20	5	1100	5498	4362	600	681600	16	1,295,040	1,558,938	-16.9
Substation-Ckt 21	6	1099	7089	7089	600	0	16	0	0	0.0
Substation-Main	7	6184	6341	6172	32000	5408000	16	10,275,200	10,204,051	0.7
oman School	8	4729	7945	7851	160	15040	16	28,576	19,353	47.7
owon School	9	7529	2913	2872	40	16 4 0	16	3,116	103	2925.2
O Area Nr Bldg 1370	10	8 897	7587	6996	10	5910	16	11,229	11,047	1.6
O Area Nr Bldg 1983	11	145	2341	2210	1200	157200	16	298,680	293,392	1.8
10 Area Nr Bldg 3930	12	147	1581	1535	1200	55200	16	104,880	110,992	-5.5
a I UH Welding Shop	13	1879	3780	2922	1	858	16	1,630	1,153	41.4
Welding Shop	14	3470	557	554	100	300	16	c 570	323	76.5
) Bldg T-822	15	6979	861	818	160	6880	16	13,072	15,834	-17.4
XX Area Nr Ofc Club	16	6218	5387	5180	1800	372600	16	707,940	416,803	69.9
lemano Mil Res	17	8177	2079	2012	1000	67000	16	127,300	114,485	11.2
30 Area Nr Bldg 3611	18	6223	1702	1454	1200	297600	16	565,440	•	-1.0
missary	19	1514	2321	2219	1200	122400	16	232,560	189,386	
rst Hawaiian Bank	20	1545	5564	5496	40	2720	16	5,168	8,357	
Sewage Trimt Plant	21	7178	9073	8877	600	117600	16	223,440		
FB Aviation Fac	22	4193	9822	9694	60	7680	16	14,592	11,565	
uth Ramp WAFB	23	4734	94887	94837	1	50	16	. 95	. 80	
TS WAFB	24	807	4141	3957	80	14720	16	27,968	24,993	
TS WAFB	25	676	3151	2919	1	232	. 16		309	
dg 114 WAFB	26	3782	370	366	1	4	16		8	0.0
una Kapu	27	5041	2789	2394	1	395	16		332	
AD A	28	6971	3788	3376	240	98880	16			
AD A	29	B004	6236	5970	160	42560	16	•	76,893	
lemano, Bldg 300	30	2566	9931	9927	200	800	16	•	1,294	
mia Tunnel	31	6611	9170	8995	4000	700000	16	•		
·ea X	32	4550	593	580	1200	15600	16			
dg T-300, WAFB	\overline{z}	6093	9662	9588	120	8880	16		1,552	
dg 1020,WAFB	34	8619	9662	9659	120	360	16	•	8,150	

(update every FY)

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A48-K101

Schofield Barracks Family Housing Reimbursements

Month,CY :	Jan-89	FY:	89										
1. Public H	lousing 1970	k After (C	at N)	**********		******		(1553) 		*******	-12		
	Units Metered	Reading No.	KWH-Meas or Est.		. Facto s/Mtrd		Billing Oty (KWH)		KWH/ Unit				
FY71	208	Estimate	156624	21		208	161895		753	•			
FY72 FY73	208 497	11 16	157200 · 372600			208 497	226731 479807		756 750				
				Total Cat	. (א) ±	} } } } 	868433	KN	нх	0.05919	=	\$\$\$	51402.55
2. Public H	lousing 1950	-1969 - (Ca	it X) - Sch	ofield Bar	racks					(Rate A-FDA)			
	Units Metered	Reading No.	K WI-M eas or Est.	Adj	. Fact	or	Billing Oty (KWH)	KWH Uni					
3000 Area	112	* 12	79968						714	-			
3000 Area	320	18	297600						930				
1400 Area	224	4	111600						498				
1300+1400	492	Estimate	366876						746				
Sub-Total	1148	خ	856044	214	0 /114	8	1595761		746				
,				Sub-total	1 Cat	(X)	: 1595761	Kle	HX	0.05919 (Rate A-FDA)		555	94453.09
Location	Units Metered	KWH/Unit (Est)	Billing Qty(KWH)	Rate A (FDA)	Co	st (\$)							
Hel eaano	32	746	23872	0.0591	9 1	412.98				-			
				Sub-total	2 Cat	(X)	23872	KNH,	\$	1412.98			
		0		Total Cat	(X) *	*****	± 1619633	KWH,	\$	95866.07			
3. Other P	ublic Housin	ng (Cat Y)											
	821	KWH/Unit	(Est) X	21	81 Uni	ts =	230701	X Ras	te A (FDA)		=	sss	13655.19
4. Sub-Sta	ndard Housin	ng - KHC (C	at 2)										
	900	KWH/Unit	(Est) X		6 Uni	ts =	5400	X Ra	te A (FDA)	0.07089	=	\$\$\$	382.81

Total SB Family Housing Total SB FH w/o KMC

2724167

2718767

161306.62

160923.81

hofield Barracks Electric Meter Readings - Sheet 1

h,CY : Mar-89 mead'g dte:	FY:	89		HECO fuel oi HELCO fuel o		-0.02899 -0.02826		Rate A : Rate B :	0.09210 0.09710	
Location	Reading No.	Meter No.	Present Reading	Previous Reading	Mult. Factor	Computed Consump. (KWH)	Interval Between Readings (Days)	KWH Per 30.4 Days	KWH Per 30.4 Days Last Month	diff (%)
100 Area Nr Bldg 111	1	2045	1804	1596	120	24960	28	27,099	28,614	- 5.3
300 Area Nr Bldg 321	2	8896	5274	4041	10	12330	28	13,387		-4.0
1300 Area Nr Bldg 1320	3	6219	4357	4239	1800	212400	28	230,606	213,750	7.9
1400 Area Nr Bldg 1320	4	154	7922	7756	1200	199200	28	216,274	202,920	6.6
SB Substation-Ckt 20	5	1100	9279	7468	600	1086600	28	1,179,737		5.1
SB Substation-Ckt 21	6	1099	7089	7089	600	0	28	0	0	0.0
SB Substation-Main	7	6184	6941	6666	32000	8800000	28	9,554,286	•	-3.3
Solomon School	8	4729	8237	8114	160	19680	28	21,367	25,688	-16.8
Solomon School	9	7529	3058	2992	40	2640	28	2,866	3,002	-4.5
1300 Area Nr Bldg 1370	10	8897	9823	8796	10	10270	28	11,150		-2.9
1900 Area Nr Bldg 1983	11	145	2819	2598	1200	265200	28	287,931	•	
3000 Area Nr Bldg 3930	12	147	1751	1675	1200	91200	28	99,017		-7.6
Area I UH Welding Shop	13	1879	6857	5630	1	1227	28	1,332	1,758	-24.2
Area I UH Welding Shop	14	3470	568	566	100	200	28	217	855	-74.6
800 Area Nr Bldg T-822	15	6979	1062	973	160	14240	28	15,461	17,024	-9.2
9000 Area Nr Ofc Club	16	6218	6153	5780	1800	671400	28	728,949	672,030	8.5
Helemano Mil Res	17	8177	2287	2203	1000	B4000	28	91,200	117,800	-22.6
200 Area Nr Bldg 3611	18	6223	2623	2219	1200	484800	28	526,354	589,380	-10.7
aissary	19	1514	2875	2661	1200	256800	28	278,811	387,600	-28.1
st Hawaiian Bank	20	1545	5840	5701	40	5560	28	6,037	5,206	16.0
SB Sewage Trimit Plant	21	7178	9778	9456	600	193200	28	209,760	218,310	-3.9
WAFB Aviation Fac	22	4193	296	14	60	16920	28	18,370	10,944	67.9
South Ramp WAFB	23	4734	95025	94968	1	57	28	62	π	-19.5
SFTS WAFB	24	807	4717	4346	80	29680	28	32,224	15,580	106.8
SFTS WAFB	25	676	3959	3585	1	374	28	406	412	-1.5
Bldg 114 WAFB	26	3782	383	376	1	7	28	8	6	33.3
Mauna Kapu	27	5041	3389	3031	1	358	28	389	230	69.1
QUAD A	28	6971	5248	4551	240	167280	28	181,618	173,964	4.4
QUAD A	29	B004	7202	6744	160	73280	28	. 79,561	77,216	3.0
Helemano, Bldg 300	30	2566	9954	9944	200	2000	28	2,171		-12.1
Kunia Tunnel	31	6611	9728	9442	4000	1144000	28	1,242,057	1,033,600	20.2
Area X	32	4550	638	615	1200	27600	28	29,966	25,080	
Bldg T-300, WAFB	33	6093	2101	2092	120	1080	28	1,173	1,026	14.3
Bldg 1020,WAFB	34	8619	9660	9662	120	0	28	0	9,500	-100.0

(update every FY)



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Schofield Barracks Family Housing Reimbursements

Month CY	:	Mar-89	FY:	89

	Units Metered	Reading No.	KWH-Meas or Est.	Adj. Factor (Tot units/Mtrd un	nits)	Billing ₽ty (KWH)	KWH/ Unit	_			
71 72 73	208 208 497	Estimate 11 16	273104 265200 671400	215 300 640	208 208 497	282295 382500 864579	1313 1275 1351				
				Total Cat (N) ***	 	1529374	KHH X	0.06311	= \$:	\$\$	96518.79
Public H	busing 1950)-1969 - (Ca	it X) - Sch	ofield Barracks		3.		(Rate A-FDA)			
	Units Metered	Reading No.	K Wil M eas or Est.	Adj. Factor		Billing Oty (KWH)	KWH/ Unit				
000 Area 000 Area 100 Area	112 320 224 492	# 12 18 4 Estimate	134624 484800 199200 613968				1202 1515 889 1248		•		
b-Total	. 1148		1432592	2140 /1148		2670511	1248				
				Sub-total 1 Cat ()	() :	2670511	кин х	0.06311 (Rate A-FDA)	= \$:	\$\$	168535.95
ocation	Units Metered	KWH/Unit (Est)	Billing Oty(KWH)	Rate A Cost (FDA)	(\$)						
esano	32	1248	39936	0.06311 2520	0.36			-			
				Sub-total 2 Cat (X) :	39936	KWH, \$	2520.36			
				Total Cat (X) ***	****	2710447	KWH, \$	171056.31			
Other Pu	blic Housin	ng (Cat Y)		,							
	1373	KWH/Unit	(Est) X	281 Units	=	385813	X Rate A (FDA)	0.06311	= \$	\$\$	24348.66
Sub-Stan	dard Housin	ng - KMC (Ca	at Z)	•							
	900	KWH/Unit	(Est) X	3 Units	I	5400	X Rate A (FDA)	0.06384	= \$	\$\$	344.74
				SB Family Housing SB FH w/o KMC		4631034 4625634			## ##	\$ \$	292268.50 291923.76

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ofield Barracks Electric Meter Readings - Sheet 1

ch,CY : Apr-89 Read'g dte:	FY:	89		CO fuel oil LCO fuel oi		-0.02630 -0.02305		(update ever Rate A : Rate B :	0.09210 0.09710	
Location	Reading No.	Meter No.	Present Reading	Previous Reading	Mult. Factor	Computed Consump. (KWH)	Interval Between Readings (Days)	KWH Per 30.4 Days	KWH Per 30.4 Days Last Month	diff (%)
100 Area Nr Bldg 111	 1	2045	2031	1804	120	27240	30	27,603	27,099	1.9
300 Area Nr Bldg 321	2	8896	6661	5274	10	13870	30	14,055	13,387	5.0
1300 Area Nr Bldg 1320	3	6219	4460	4357	1800	185400	30	187,872	230,606	-18.5
1400 Area Nr Bldg 1320	4	154	8105	7922	1200	219600	30	•	216,274	2.9
SB Substation-Ckt 20	5	1100	11215	9279	600	1161600	_	1,177,088		-0.2
SB Substation-Ckt 21	6	1099	7089	7089	600	0	30	•	0	0.0
SB Substation-Main	7	6184	7253	6941	32000	9984000	30	10,117,120	9,554,286	5.9
Salamon School	8	4729	8424	8237	160	29920	30	30,319	21,367	41.9
Solomon School	9	752 9	3146	3058	40	3520	30	3,567	2,866	24.5
1300 Area Nr Bldg 1370	10	8897	11042	9823 ,	10	12190	30	12,353	11,150	10.8
1900 Area Nr Bldg 1983	11	145	3059	2819	1200	288000	30	291,840	287,931	1.4
3000 Area Nr Bldg 3930	12	147	1841	1751	1200	108000	30	109,440	99,017	10.5
Area I UH Welding Shop	13	1879	7922	6857	1	1065	30	1,079	1,332	-19.0
Area I UH Welding Shop	14	3470	570	568	100	200	30	203	217	-6.5
800 Area Nr Bldg T-822	15	6979	1168	1062	160	16960	30	17,186	15,461	11.2
9000 Area Nr Ofc Club	16	6218	6557	6153	1800	727200	30	736,896	728,949	1.1
Helemano Mil Res	17	8177	2301 2	401 2287	1000	14000	30	14,187	91,200	-84.4
00 Area Nr Blog 3611	18	6223	3111	2623	1200	585600	30	593,408	526,354	12.7
missary	19	1514	3103	2875	1200	273600	30	277,248	278,811	-0.6
rirst Hawaiian Bank	20	1545	5997	5840	40	6280	30	6,364	6,037	5.4
SB Sewage Triat Plant	21	7178	10138	9 778	600	216000	30	218,880	209,760	4.3
WAFB Aviation Fac	22	4193	407	296	60	6660	30	6,749	18,370	
South Ramp WAFB	23	4734	95094	9 5025	1	69	30		62	-
SFTS WAFB	24	807	5152	4717	80	34800	30	35,264	32,224	
SFTS WAFB	25	676	4397	3959	1	438	30		406	
Bldg 114 WAFB	26	3782	391	383	1	8	30		8	
Mauna Kapu	27	5041	3663	3389	1	274	31		389	
DUAD A	28	6971	5907	5248	240	158160	30	•	181,618	
DUAD A	29	8004	7689	7202	160	77920	30	78,959	79,561	
Helemano, Bldg 300	30	2566	9963	9954	200	1800	30	•	2,171	
Kunia Tunnel	31	2566	10022	9728	4000	1176000	30			
Area X	32	4550	660	638	1200	26400	30		29,966	
Bldg T-300, WAFB	33	6093	2110	2101	120	1080	30	•	•	
Bldg 1020,WAFB	34	8619	9656	9652	120	480	30	486	0	0.0

-K101 .ofield Barracks Family Housing Reimbursements

Month,CY	: Apr-89	FY:	89									
1. Public	 Housing 1970	& After (C	Cat N)	**********	:##### ::		-2::22:23:	========				
	Units Metered	Reading No.	KWH-Meas or Est.	Adj. (Tot unit:	. Factor s/Mtrd (Billing Qty (KWH)	KWH/ Unit				
FY71 FY72 FY73	208 208 497	Estimate 11 16	296192 288000 727200	215 300 640)	208 208 497	306160 415385 936435	1424 1385 1463	-			
				Total Cat	(N) ##	 	1657980	KMH X	0.06580	=	\$\$\$	109095.08
2. Public	Housing 1950	-1969 - (Ca	it X) - Schi	ofield Barı	acks				(Rate A-FDA)			
	Units Metered	Reading No.	KWH-Meas or Est.	Adj	. Factor	•	Billing Oty (KWH)	KWH/ Unit				
3000 Area 3000 Area 1400 Area 1300+1400	112 320 224 492	* 12 18 4 Estimate	157360 585600 219600 721920					1405 1830 980 1467	•			
-Total	1148	,	1684480	2146	/1148		3140059	1467				
				Sub-total	1 Cat	(X) :	3140059	KWH X	0.06580 (Rate A-FDA)		\$\$\$	206615.88
Location	Units Metered	KWH/Unit (Est)	Billing Qty(KWH)	Rate A (FOA)	Cost	: (\$)						
Helemano	32	1467	46944	0.0658	0 301	38.92	******		•			
				Sub-total	2 Cat	(X) :	46944	KWH, \$	3088.92			
				Total Cat	(X) ++	*****	3187003	KWH, \$	209704.80			
3. Other P	ublic Housin	g (Cat Y)										
	1614	KWH/Unit	(Est) X	28	1 Unit	s =	453534	X Rate A (FOA)	0.06580	=	\$\$\$	29842.54
4. Sub-Sta	ndard Housin	ng - KMC (C	at 2)					· · · · · · · · · · · · · · · · · · ·				-
	900	KWH/Unit	(Est) X		6 Unit	5 =	5400	X Rate A (FDA)	0.06905	=	\$\$\$	372.87
				SB Family SB FH w/o		9	5303917 5298517				+ \$ + \$	349015.29 348642.42

Schofield Barracks Electric Meter Readings - Sheet 1

Month, CY: Jun-89 FY: HECO fuel oil rate : -0.02183 Rate A 0.09210 Read'g dte: HELCO fuel oil rate : -0.02067 Rate B 0.09710 Reading KWH Per KNH Per Location Meter Present Previous Muit. Computed Interval diff No. No. Reading Reading Factor Consump. Between 30.4 30.4 (%) (KMH) Readings Davs Days (Days) Last Month 100 Area Nr Bldg 111 28,576 28,663 -0.3 13,852 300 Area Nr 81dq 321 13,756 0.7 1300 Area Nr Bldg 1320 182,400 207,154 -11.91400 Area Nr Bldg 1320 200,640 211,063 -4.9 769,728 1,186,251 SB Substation-Ckt 20 -35.1 SB Substation-Ckt 21 525,920 0.0 SB Substation-Main 30 10,538,667 10,144,914 3.9 Solomon School 17,835 25,883 -31.1 Solomon School 2,473 2,823 -12.4 1300 Area Nr Bldg 1370 10,002 11,813 -15.3 1900 Area Nr Bldg 1983 280,896 293,143 -4.2 3000 Area Nr Bldg 3930 98,496 100,320 -1.8 Area I UH Welding Shop 1,033 -66.7 -68.8 Area 1 UH Welding Shop 800 Area Nr Bldg T-B22 15,078 16,329 -7.7 9000 Area Nr Bfc Club 747,840 738,720 1.2 Helegano Mil Res 125,653 120,514 4.3 1000 Area Nr Bidg 3611 525,312 549,B06 -4.5301,568 267,086 12.9 omnissary 6,688 First Hawaiian Bank 7,661 14.5 214,624 199,989 7.3 SB Sewage Trimt Plant 20,003 21,432 WAFB Aviation Fac -6.7 South Ramp WAFB -1.5 39,867 SFTS WAFB 43,452 9.0 SFTS WAFB 2.2 Bldg 114 WAFB -8.3 Mauna Kapu 292 192.8 QUAD A 195,290 192,302 1.6 A CAUS 83,174 84,425 -1.5Helemano, Bldg 300 2,027 2,606 -22.2 Kunia Tunnel 1,179,520 1,220,343 -3.3 37,696 28,663 31.5 Area X Bldg T-300, WAFB -46.7 Bldg 1020, WAFB 86.8

(update every FY)



Hield Barracks Family Housing Reimbursements

:h,CY : Jun-89

FY:

blic ት	lousing 197	0 & After ((Cat N)								
	Units Metered	•	KWH-Meas or Est.		Factor /Mtrd units)	Billing Oty (KWH)	KWH/ Unit				
1	208		293072		208	302935	1409				
2 3	208 497		277200 738000		208 497	399808 950342	1333 1485				
					(N) 1111111			0.07027	=	\$\$\$	116162.2
Public H	lousing 195	0-1969 - (Ca	at X) - Sch	ofield Barra	acks	`		(Rate A-FOA)			
	Units	Reading	KWH-Meas	Adj.	Factor	Billing	KWH/				
	Metered	No.	or Est.			Oty (KWH)	Unit	-			
0 Area	112		140224				1252				
O Area	320 224		518400				1620 884			•	
	492		198000 642468				1306				
-Total	1148		1499092	2140	/1148	2794475	1306				
				Sub-total 1	Cat (X) :	2794475	KWH X	0.07027 (Rate A-FDA)	=	\$\$\$	196367.76
cation	Units Metered	KWH/Unit (Est)	Billing Oty(KWH)	Rate A (FDA)	Cost(\$)						
Pmano	32	1306	41792	0.07027	2936.72			•			
				Sub-total 2	Cat (X) :	41792	KWH, \$	2936.72			
		**************************************		Total Cat (X) +++++++	2836267	KWH, \$	199304.48			
Other Pul	blic Housin	ig (Cat Y)									
•	1437	K₩H/Unit	(Est) X	281	Units =	403797	X Rate A (FOA)	0.07027	=	\$\$\$	28374.82
Sub-Stano	dard Housin	ig - KMC (Ca	t Z)								*******
_	900	K₩H/Unit	(Est) X	6	Units =	5400	X Rate A (FDA)	0.07143	=	\$\$\$	385.72
0		**********		SB Family H SB FH w/o K	•	4898549 4893149				===== \$ \$	344227.30 343841.58



Schofield Barracks Electric Meter Readings - Sheet 1

| Month,CY : Jul-B9 | FY: B9 | HECD fuel oil rate : -0.02010 | Rate A : 0.09210 | Read'g dte: | HELCD fuel oil rate : -0.01513 | Rate B : 0.09710

						•••••	nate b . Olomio				
Location	Reading No.	Meter No.	Present Reading	Previous Reading	Hult. Factor	Computed Consump. (KWH)	Interval Between Readings (Days)	Days	KWH Per 30.4 Days Last Month	- (%)	
100 Area Nr Bldg 111	1	2045	2796	2486	120	37200	37	30,564	28,576	7.0	
300 Area Nr Bldg 321	2	8896	10975	9295	10	16800	37	13,803	13,852	-0.4	
1300 Area Nr Bldg 1320	3	6219	4889	4766	1800	221400	37	181,907	182,400	-0.3	
1400 Area Nr Bldg 1320	4	154	B649	B432	1200	260400	37	213,950	200,640	6.6	
SB Substation-Ckt 20	5	1100	5326	4302	600	614400	34	549,346	769,728	-28.6	
SB Substation-Ckt 21	6	1099	4189	2954	600	741000	33	682,618	525,920	29.B	
SB Substation-Main	7	6184	8284	7870	32000	13248000	37	10,884,843	10,538,667	3.3	
Solomon School	В	4729	8768	8683	160	13600	37	11,174	17,835	- 37.3	
Solomon School	9	7529	3331	3272	40	2360	37	1,939	2,473	-21.6	
1300 Area Nr Bldg 1370	10	8897	4476	3117	10	13590	37	11,166	10,002	11.6	
1900 Area Nr Bldg 1983	11	145	3819	3515	1200	364800	37	299,728	280,896	6.7	
3000 Area Nr Bldg 3930	12	147	2102	1999	1200	123600	37	101,552	98,496	3.1	
Area 1 UH Welding Shop	13	1879	1926	9212	1	0	37		344	-100.0	
Area I UH Welding Shop	14	3470	582	57B	100	400	37		203		
Area Nr Bldg T-B22	15	6979	1465	1355	160	17600	37	14,461	15,078	-4.1	
rea Nr Ofc Club	16	6218	7891	7376	1800	927000	37	761,643	747,840	1.8	
ano Mil Res	17	B177	2781	2636	1000	145000	37	•	125,653	- 5.2	
3000 Area Nr Bldg 3611	18	6223	4526	3965	1200	673200	37	•	525,312	5.3	
Commissary	19	1514	3847	3556	1200	349200	37	•	301,568		
First Hawaiian Bank	20	1545	6484	6340	40	5760	37	•	7,661		
SB Sewage Trimt Plant	21	7178	1389	7 9 8	600	354600	37	•			
WAFB Aviation Fac	· 22	4193	1417	1075	60	20520	37	•			
South Ramp WAFB	23	4734	95219	95219	1	0	37			-100.0	
SFTS WAFB	24	B07	6785	6147	B0	51040	37		•		
SFTS WAFB	25	676	5585	5175	1	410	37		412		
Bldg 114 WAFB	26	3782	424	413	1	11	37		11		
Mauna Kapu	27	5041	5631	4776	1	855	37			-17.9	
DUAD A	28	6971	8591	7538	240	252720	37	•			
DUAD A	29	8004	9319	8688	160	100960	37	•			
Helemano, Bldg 300	30	2566	9991	9985	200	1200	37		•		
Kunia Tunnel	31	6611	958	594	4000	1456000	37				
Area X	32	4550	756	713	1200	51600	37	•	•		
Bldg T-300, WAFB	33	6093	2146	2121	120	3000	37				
Bldg 1020,WAFB	34	8619	9647	9634 -	120	1560	37 37		973	31.8	



Month, CY	:
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Jul-89

FY:

89

	Units Metered	Reading No.	KWH-Meas or Est.	Adj. (Tot units	Factor /Mtrd u		Billing Qty (KWH)	KWH/ Unit			
FY71 FY72 FY73	208 208 497	Estimate 11 16	376480 364800 927000	215 300 640	208		389150 526154 1193722	1810 1754 1865	•		
				Total Cat	(N) ***	****	2109026	KWH X	0.07200	= \$\$	\$ 151849.87
2. Public H	lousing 1950	-1969 - (Ca	it X) - Schi	ofield Barr	acks		`	******	(Rate A-FOA)		
	Units Metered	Reading No.	KWH-Meas or Est.	Adj.	Factor	•	Billing Qty (KWH)	KWH/ Unit	_		
3000 Area 3000 Area 1400 Area 1400 Area	112 320 224 492	* 12 18 4 Estimate	183008 673200 260400 837456					1634 2104 1163 1702	3		
Sub-Total	1149	,	1954064	2140	/1148		3642593	1702			
				Sub-total	1 Cat	(X) :	3642593	KWH X	0.07200 (Rate A-FDA)	= \$1	262266.70
Location	Units Metered	KWH/Unit (Est)	Billing Qty(KWH)	Rate A (FDA)	Cost	£(\$)					
Heiemano	32	1702	54464	0.07200	392	21.41					
				Sub-total	2 Cat	(X) :	54464	KWH, \$	3921.41		
				Total Cat	(X) +1	11111	3697057	KWH, \$	266188.11		
3. Other Po	ublic Housir	ng (Cat Y)						·			
	1872	KWH/Unit	(Est) X	28.	1 Unit	s =	526032	X Rate A (FDA		= \$:	37874.30
4. Sub-Sta	ndard Housin	ng - KMC (C	at 7)	~~~~~							
	900	K₩H/Unit	(Est) X	•	6 Unit	s =	5400	X Rate A (FDA		= \$:	\$\$ 415.64
				SB Family SB FH w/o		9	6337515 6332115	.========	····	## ##	



Schofield Barracks Electric Meter Readings - Sheet 1

ionth,CY: Aug-89	FY:	89		HECO fuel oil		Rate A : 0.09210				
Read'g dte:				HELCO fuel of	il rate :	-0.01621		Rate B :	0.09710	
Location	Reading	Meter	Present	Previous	Mult.	Computed	Interval	KWH Per	KWH Per	diff
	No.	No.	Reading	Reading	Factor	Consump.	Between	30.4	30.4	(%)
						(KWH)	Readings	Days	Days	
							(Days)		Last Month	
100 Area Nr Bldg 111	1	2045	2983	2796	120	22440	24	28,424	30,564	-7.
500 Area Nr Bldg 321	2	8896	1926	975	10	9510	24	12,046	13,803	-12.
300 Area Nr Bldg 1320	3	6219	4990	4889	1800	181800	24	230,280	181,907	26.
400 Area Nr Bldg 1320	4	154	8787	8649	1200	165600	24	209,760	213,950	-2.
SB Substation-Ckt 20	5	900	0	0	2771	0	24	0	549,346	-100.
SB Substation—Ckt 21	6	651	504	0	2771	1396584	24	1,769,006	682,618	159.
SB Substation-Main	7	6184	8555	8284	~ 32000	8672000	24	10,984,533	10,884,843	٥.
Solomon School	8	4729	8821	8768	160	8480	24	10,741	11,174	-3.
Solomon School	9	7529	3373	3331	40	1680	24	2,128	1,939	9.
300 Area Nr Bldg 1370	10	8897	5330	4476	10	8540	24	10,817	11,166	-3.
1900 Area Nr Bldg 1983	11	145	4002	3819	1200	219600	24	278,160	299,728	-7.
3000 Area Nr Bldg 3930	12	147	2165	2102	1200	75600	24	95,760	101,552	-5.
rea I UH Welding Shop	13	1879	2777	1926	1	851	24	1,078	0	0.
rea I UH Welding Shop	14	3470	587	582	100	500	24	633	329	
ea Nr Bldg T-822	15	6979	1543	1465	160	12480	24	15,808	14,461	9.
rea Nr Ofc Club	16	6218	8314	7891	1800	761400	24	964,440	761,643	
Helemano Mil Res	17	8177	2884	2781	1000	103000	24	•	119,135	
3000 Area Nr 81dg 3611	18	6223	4870	4526	1200	412800	24	522,880	553,116	
Commissary	19	1514	4047	3847	1200	240000	24	304,000	286,910	
irst Hawaiian Bank	20	1545	6630	6484	40	5840	24	7,397	4,733	56.
BB Sewage Trimit Plant	21	7178	1617	1389	600	136800	24	173,280	291,347	
AFB Aviation Fac	22	4193	1663	1417	60	14760	24		16,860	
South Ramp WAFB	23	4734	95354	9 521 9	1	135	24		0	
SFTS WAFB	24	807	7208	6785	80	33840	24		41,936	
SFTS WAFB	25	676	5875	5585	1	290	24		337	
Bldg 114 WAFB	26	3782	433	424	1	9	24		9	
fauna Kapu	27	5041	6407	5631	1	776	17	•	- 702	
DUAD A	28	6971	9258	8591	240	160080	24	202,768	207,640	
DUAD A	29	8004	9714	9319	160	63200	24	•	82,951	
Helemano, Bldg 300	30	2566	9999	9991	200	1600	24	2,027		105.
Cunia Tunnel	31	6611	1200	958	4000	968000	24	1,226,133	1,196,281	
Area X	32	4550	781	756	1200	30000	24	•	42,396	
Bldg T-300, WAFB	\overline{x}	6093	2153	2146	120	840	24	•	2,465	
31dg 1020,WAFB	34	8619	9670	9647	120	2760	24	3,496	1,282	172.

APPENDIX C-3
CORRESPONDENCE



SCH11-2.LET P89037.02

November 2, 1989

Department of the Army U.S. Army Engineering District, Honolulu Military Branch Fort Shafter, Hawaii 96858-5440

Attention: Mr. David Lindsey

Gentlemen:

Energy Savings Opportunity Survey (ESOS) of Schofield Barracks Family Housing Areas A, D, E, F, I, J, K-1

Attached is our tentative progress schedule for the completion of work for this project.

Please feel free to call us if you would like further clarification of our proposed schedule.

Sincerely,

Cedric D. O. Chong, P. F.

President

CDOC:fa

PROGRESS SCHEDULE

TASK	DATE
------	------

1.0	NOTICE TO PROCEED	September 25, 1989
2.0	INTERIM SUBMITTAL	Sept 25 - Jan 25, 1990
2.1	Entry Interview	December 4, 1989
2.2	Field Survey	December 5-28, 1989
2.3	Exit Interview	December 29, 1989
2.4	Analyze ECO's/Prepare Interim Report	Dec 29, 1989 - Jan 25, 1990
3.0	GOVERNMENT REVIEW	Jan 26 - Feb 26, 1990
4.0	PRE-FINAL SUBMITTAL	Feb 26 - Mar 30, 1900
5.0	GOVERNMENT REVIEW	Mar 30 - Apr 30, 1990
6.0	FINAL SUBMITTAL	Apr 30 - May 30, 1990



CEDRIC D. O. JONG & ASSOCIATES, INC. . MECHA. . CAL & ELECTRICAL ENGINEERS

December 5, 1989

Department of the Army U.S. Army Engineering District, Honolulu Military Branch Fort Shafter, Hawaii 96858-5440

Attention: David Lindsey

Gentlemen:

Energy Savings Opportunity Survey (ESOS) of Schofield Barracks Family Housing Areas A, D, E, F, I, J, K-1

Attached is our proposed schedule for the field survey of the family housing.

Please feel free to call us if you would like to change any of the survey dates.

Sincerely,

Joel Ywen. P.E.

LK:fa

JILDING	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED DATE FOR SURVEY
49 50 51 52 53 54 55 56 57	32-I 		2	1	A 	12/11/89 MONDAY
60	↓		↓ ↓	¥	↓ ↓	↓
61 62 63 64 65 66 71 72 73 74	32-II 		2 	1 ,	A	12/11/89 MONDAY
81 83 85	71-I ↓	A,B A,B	4 - 	1 	A ->	12/12/89 TUESDAY ↓
410 425 426 441 442 510 525 526 542 701 712 713 724 735	20-II 		4		D	12/12/89 TUESDAY

. •		. ~				·
BUILDING	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULEI DATE FOR SURVEY
401	20-111		3	1	D	12/14/89
402	ľ		!		!	THURSDAY
403	!		!	!	ļ	ļ.
404	!		ļ	ļ.	!	!
405 406	į		•	!	!	!
408	į		Ĭ	ļ	ļ	!
	!		ļ	!	ļ	
408	!		!	!	ļ	!
411	ļ.		!		į	ļ.
412	!		!	ļ	ļ	!
413 414	İ		l l	ļ	į	Ĭ
414	i			ļ	į	į
416	! I		!	ļ i	 	į
417	į.		!	ļ	į !	!
418	+		 	\	1	1
409	57-I	A 12	2			12/1//00
802	3/-1	A,B	2	1	17	12/14/89 THURSDAY
814	i I	i I	i I	í t	1 1	INUKSDAT
835	i 1	i i	ا .	1		1.
	•••••		·····		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
509	20-VI		5	1	E	12/15/89
601	32-111		3	1	F	12/15/89
603	1		1	1	1	FRIDAY
605	1		1	!	1	1
607	1		1	I	1	1
609	1		1	1	1	1
611	1		1	1	1	1
613	1		i	1	1	1
614	1		1	1	1	1
615	1		1	ı		1
616	ļ		!	!	ļ	!
617	ļ		!	ļ	ļ	!
618	į.		!	!	!	!
619 621	!		!	!	- !	!
622	1		1	ŀ	1	i
623	1		i i	1	ļ	1
	••••		······			
600	32-IV		4	1	F	12/15/89
602	1		1	1	1	FRIDAY
604	1		1	1	I	I
606	1		ļ	1	1	l
608	I		ļ	1	Į.	ļ
610	ļ		!	ļ	ļ	ļ
612	!		ļ		!	ļ
620	ļ		ļ	!	ļ	ļ
633	4		J-	N.		٠. ـ

JILDING	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED DATE FOR SURVEY
803 804 805 806 807 808 809 816 817 818 819 820 821 822 823	20-IV		3 		J	12/18/89 MONDAY
824 810 811 830 831 832 833 844	20-V 	A,B	2 	1	J	12/18/89 MONDAY
802 814 835	57-I ↓	A,B ↓ ↓	2 	1 ! •	J ↓	12/19/89 TUESDAY ↓
3401 3402 3405 3406 3410 3411 3413 3414	57-II 	A,B 	3 	2 	K-1	12/19/89 TUESDAY
3403 3409 3418 3419 3423 3508 3515 3518	57-III	A,B 	3 	1 	K-1	12/20/89 TUESDAY

UILDING	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED
						DATE
\						FOR
)						SURVEY
3427	57-IV	A,B,C,D	3	2	K-1	12/20/89
3432		A,B,C,D	1	1	i	WEDNESDAY
3433	1	B,C	1	İ	1	†
3434	1	B,C		I	1	
3436	İ	B,C	1	l	1	1
3438	J	B,C	\	\	\downarrow	↓
3903	57-1X	A,B,C,D	3	2	K-1	12/21/89
3908	İ	i		Ī	1	THURSDAY
3909	į	i	i	i	i	1
3910	→	↓	j	4	Ĵ-	•
2/07		· · · · · · · · · · · · · · · · · · ·			12 3	10/01/00
3427	57-V	E	2	i	K-1	12/21/89
3432		E		ļ	ļ	THURSDAY
3433		A,D		ļ		ļ
3434 3436	ļ	A,D				
3438	ļ	A,D	ļ			I
3436 3440	-	A,D		!		l f
3440	!	A	ļ	l t	l i	ļ
3444	ļ	A,D E		ļ	j i	
3445		A,D	ا	l t	ا	
	• • • • • • • •					,
3430	57-VI	A,B,C,D	3	2	K-1	12/22/89
3608	1		1	1		FRIDAY
3704	1	İ	1	ļ	ļ	ļ
3713	4	V	→ ,	↓	↓	<i>▶</i>
3900	57-VII	A	2	1	K-1	12/22/89
3904	I	A	ī	Ī	1	FRIDAY
3905	j.	E	i	i	i	ı
3913	į	Α	į	İ	i	j
3914	İ	E	j	İ	Ì	İ
3916	Ú	Α	↓	1	↓	J
3900	57-VIII	B,C,D,E	3	2	K-1	12/26/89
3904	1	B,C,D,E	ĺ	ī	1	TUESDAY
3905	i	A,B,C,D	i	i	i	1
3913	Ļ	B,C,D,E	j.	↓	j.	,
• • • • • • •	· · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • • •			· · · · · · ·	10/02/00
3917	60-I	A,B,C,D	2	2	K-1	12/26/89
3924	ļ	ļ		ļ	ļ	TUESDAY
3934]	!	ļ	ļ		ļ
3935	↓		y	J	. ↓	
3922	60-11	A,B,C,D	4	2	K-1	12/27/89
3933	İ	ĺ	1	1	1	WEDNESDAY
3936	i	į	j	İ	İ	1
3939	مأد	i	رأ.	ا.	.1_	L

BUILDING	ТҮРЕ	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED DATE FOR SURVEY
3918	60-III	A,B,C,D	3	2	K-1	12/27/89
3919	1	i	1	1	1	WEDNESDAY
3920	i	j	j	į	ĺ	1
3921	1	J	7	J	1	1

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esos.mtg 89-037.02

MEETING MEMORANDUM

Date:

December 8, 1989

Project:

Schofield Barracks Family Housing ESOS

Subject: Entry Meeting

Attendees:

Name	<u>Organization</u>	Phone No.		
David Lindsey	CEPOD-ED-MI	438-6938		
Joel Yuen	Cedric Chong & Assoc.	847-6557		
Linda Koyanagi	Cedric Chong & Assoc.	847-6557		
James Kenolo	OCFHO-SB	655-0642/8943		

The following is a summary of items discussed and actions to be taken:

1) The troops will be working on a Christmas schedule starting December 20, 1989. Due to the holiday season it will be inconvenient for the survey to take place during this time. The field work shall be rescheduled to begin on January 8, 1990 and to finish by January 26, 1989.

The submittal dates for the study shall be revised to to accommodate the delay in the field work. A new schedule is attached for review & approval by the Corps of Engineers and OCFHO-SB.

- 2) The survey schedule includes sixteen units of each type to ensure an adequate sampling. Only the first six open units of each type available for inspection will actually be surveyed.
- 3) The survey shall consist of a short interview of the house resident, taking nameplate data on equipment & appliances, and taking measurements of hot water temperatures, flow rates, lighting levels, equipment amperages, etc. Housing occupants will not be required to move or lift furniture. The time required to survey each unit will be approximately half an hour.
- 4) Light Fixtures - Some of the unit types have high ceilings and will require the use of 6' ladders to reach the light fixtures (Bldgs 410 through 835), the other unit ceilings can be accessed using a 4' stepladder. Both ladders may be borrowed from OCFHO-SB. The lamps for fluorescent light fixtures are provided by the Government, incandescent light bulbs are provided by the resident.

- 5) There are no existing water flow restrictors provided on fixtures.
- 6) Central air conditioning provided in some of the officer's quarters have been disconnected to save energy. All air conditioning is now provided by the occupant (window units).
- 7) The following appliances are provided by the Government: washers, dryers, refrigerators, ranges, dishwashers (either built-in or portable), and garbage disposals. The unit types with high ceilings do not have range hoods (Bldgs 410 through 835). All units have existing heat pumps, but some are not working and have been disconnected. None of the units to be surveyed have any gas appliances.
- 8) Electricity The Government pays for all electrical bills. Metering is done by areas, not by individual units. The Corps of Engineers will have James Dati provide additional information on how electricity is billed. 655-7517
- 9) The survey shall be conducted between the hours of 9:00 am to 12:00 pm and 1:00 pm to 4:00 pm. Our business card shall be presented to the resident as identification. One team made up of 2 persons shall be conducting the survey. Names and other information on the survey personnel were presented to the PDE.
- 10) Unit type floor plans were provided by OCFHO-SB. Mechanical and electrical as-builts can be obtained at Wheeler Air Force Base, Bldg 113 (DFE).

Respectfully Submitted,

Yoel Yuen, P.E. Vice-President

LK:1k

PROGRESS SCHEDULE (REVISED)

May 30 - June 30, 1990

	TASK	DATE
1.0	NOTICE TO PROCEED	September 25, 1989
2.0	INTERIM SUBMITTAL	Sept 25, 1989 - Jan 25, 1990
2.1	Entry Interview	December 8, 1989
2.2	Field Survey	Jan 8-25, 1990
2.3	Exit Interview	January 25, 1990
2.4	Analyze ECO's/Prepare Interim Report	Jan 26 - Feb 26, 1990
3.0	GOVERNMENT REVIEW	Feb 26 - Mar 26, 1990
4.0	PRE-FINAL SUBMITTAL	Mar 26 - Apr 30, 1990
5.0	GOVERNMENT REVIEW	Apr 30 - May 30, 1990

6.0 FINAL SUBMITTAL

))	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED DATE FOR SURVEY
49 50 51 52 53 54 55 56 57 58 60	32-I 		2	1	A	1/8/90 MONDAY
61 62 63 64 65 66 71 72 73 74	32-II 		2	1	A	1/8/90 MONDAY
81 83 85	71-I 	A,B A,B	4 	1 	A 	1/9/90 TUESDAY ↓
410 425 426 441 442 510 525 526 542 701 712 713 724 735	20-II 		4		D	1/9/90 TUESDAY

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BUILDING	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED DATE FOR SURVEY
401	20-111		3	1	D	1/10/90
402 403	ļ		ļ	!	1	WEDNESDAY
404	1		ŀ	!	1	1
405	1		i	1	i	ì
406	i		i	i	i	i
407	i		i	i	i	i
408	į		1	ĺ	1	ĺ
411	1		ł	1	1	ı
412	1		l	1	1	1
413	1		l	!	1	ļ.
414	!		ļ	!	1	ļ.
415	1		!	!	!	!
416 417	1		1	1	1	1
418	‡		↓	↓ ·	↓	↓
409	57-I	A,B	2	1	J	1/10/90
802	1	1	Ī	ī	1	WEDNESDAY
814	į.	i	i	i	i	1
835	\	\	\	\checkmark	↓	*
509	20-VI		5	1	E	1/11/90 THURSDAY
601 603 605 607	32-III 		3 	1	F 	1/11/90 THURSDAY
609 611 613 614 615] 	
616 617 618 619 621 622	! ! ! !				 	
623	¥		¥	*	\	→
600 602 604 606 608 610	32-IV	•••••	4 	1	F	1/11/90 THURSDAY
612 620 633	\ \ \		 	- - -	- →	 -

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BUILDING	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED DATE FOR SURVEY
803 804 805 806 807 808 809 816 817 818 819 820 821 822 823	20-IV		3	1	7	1/12/90 FRIDAY
810 811 830 831 832 833 844	20-V	A,B 	2 	1	J	1/12/90 FRIDAY
802 814 835	57-I ↓	A,B 	2 ↓	1 	J ↓	1/15/90 MONDAY ↓
3401 3402 3405 3406 3410 3411 3413 3414	57-II 	A, B 	3 - 	2 	K-1 	1/15/90 MONDAY
3403 3409 3418 3419 3423 3508 3515 3518	57-III 	A, B 	3 	1	K-1 	1/16/90 TUESDAY

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PUILDING	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED DATE FOR SURVEY
3427 3432 3433 3434 3436 3438	57-IV 	A,B,C,D A,B,C,D B,C B,C B,C B,C	3 	2 	K-1	1/16/90 TUESDAY
3903 3908 3909 3910	57-IX	A,B,C,D 	3 ! ! •	2 	K-1 ↓	1/17/90 WEDNESDA'
3427 3432 3433 3434 3436 3438 3440 3442 3444	57-V 	E E A,D A,D A,D A A E A,D	2 	1	K-1	1/17/90 WEDNESDAY
430 3608 3704 3713	57-VI 	A,B,C,D ↓	3 	2 	K-1 ↓	1/18/90 THURSDAY
3900 3904 3905 3913 3914 3916	57-VII 	A A E A E	2 ! ! !	1	K-1 -	1/18/90 THURSDAY
3900 3904 3905 3913	57-VIII 	B,C,D,E B,C,D,E A,B,C,D B,C,D,E	3 	2 	K-1 ↓	1/19/90 FRIDAY
3917 3924 3934 3935	60-I 	A,B,C,D 	2 	2 - -	K-1 •	1/19/90 FRIDAY
3922 3933 3936 3939	60-II 	A,B,C,D	4 	2 	K-1 	1/22/90 MONDAY

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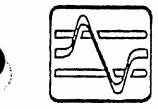
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BUILDING	TYPE	APARTMENT	BEDROOMS	STORIES	AREA	SCHEDULED DATE FOR SURVEY
3918	60-111	A,B,C,D	3	2	K-1	1/22/90
3919	j	1	1	1	1	MONDAY
3920	Ì	į	i	Ì	i	1
3921	4	\	\checkmark	\checkmark	Ψ	4

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Security Clearance Information for Schofield Barracks ESOS Field Surveyors

		NAME	·	
	1.	Joel Yuen		
	2.	Linda Koyanagi		
PII Redacted	3.	Joseph Nguyen		
	4.	Greffin Asprec		
	5.	Rick Espinosa		



CEDRIC D.O. CHONG & ASSOCIATES, INC.

CONSULTING MECHANICAL AND ELECTRICAL ENGINEERS
2130-E North King Street, Honolulu, Hawaii 96819-4527
Phone: (808) 847-6557 Telefax: (808) 847-6550

DATE:	2/16/90	_ TIME SE	NT: 3:45 pm	CDOCA JOB NO. 89	-037.02
	David 1				•
AT:	CEPOD	- ED - HI		FAX NO	·
FROM:	Joel y	uln		TOTAL PGS. INCL. THIS	s:
RF•	850S	Study @	Schofield	Barracks	
1 14-1		J			

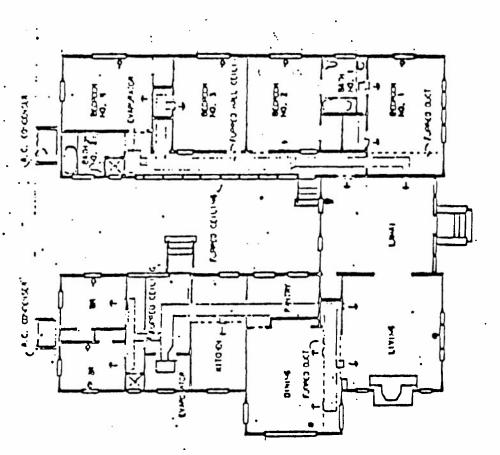
IN ADDITION TO THE ITEMS PREVIOUSLY REQUESTED WE WOULD LIKE THE FOLLOWING INFORMATION:

- 1) Wattages/Voltages of fixtures used for street lighting in Areas A, D, E, F, I, I, K-1
- 2) Type of lamps used (Metal Halide, Low Pressure Sodium, Incadescent, etc.)
- 3) Type of circuit series or parallel
- 4) Minimum Lighting level required

 4) foot candle on street

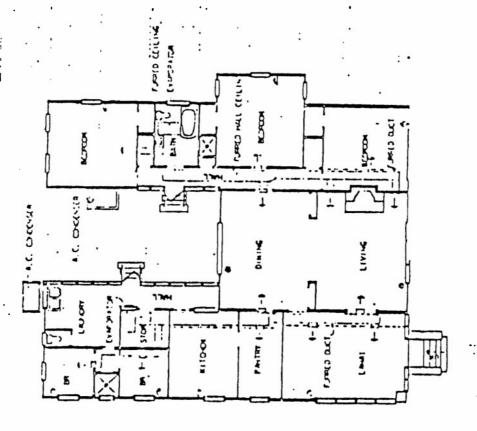
 6) foot candle at intersection

10.146.9 17.027 10.1066.7 19.066.7 12.023500 12.023500	\$37.7 \$37.7 \$37.7 \$37.7 \$37.7 \$37.7 \$37.7 \$37.8
19200.0 19200.0 19200.0 18400.0 18400.0 1170.48000 1170.48000	2011.00 201
28 1H H H H H H H H H H	\$50668.78 \$50668.78 \$558996.72 \$02515.65 \$02515.65 \$1320.71 \$1310.7.05 \$1310.
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DATE 1988 19200.0 19200.0 166.0.0 186.0.0 186.0.0 18.00.0 18.00.0 18.00.0 18.00.0 18.00.0 18.00.0 18.00.0 18.00.0 18.00.0	25709.99- 25709.99- 257711.39- 257711.39- 25550.63- 25950.68- 2595
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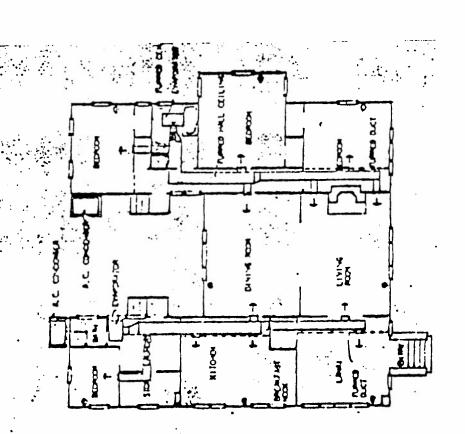
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תממ אנו אניו וייי וייי UNIT TYPE 20-II

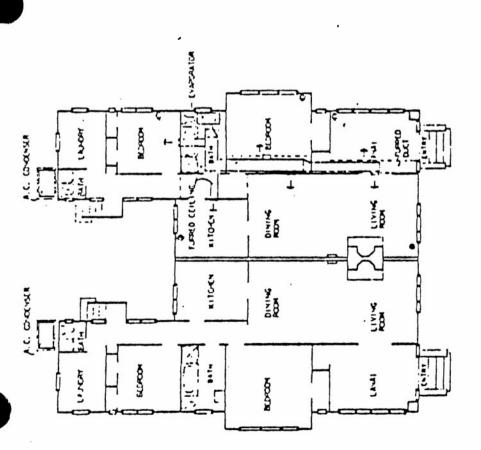


ADD A.W. 1/8" - 1'-0"

UNIT TYPE 20-III

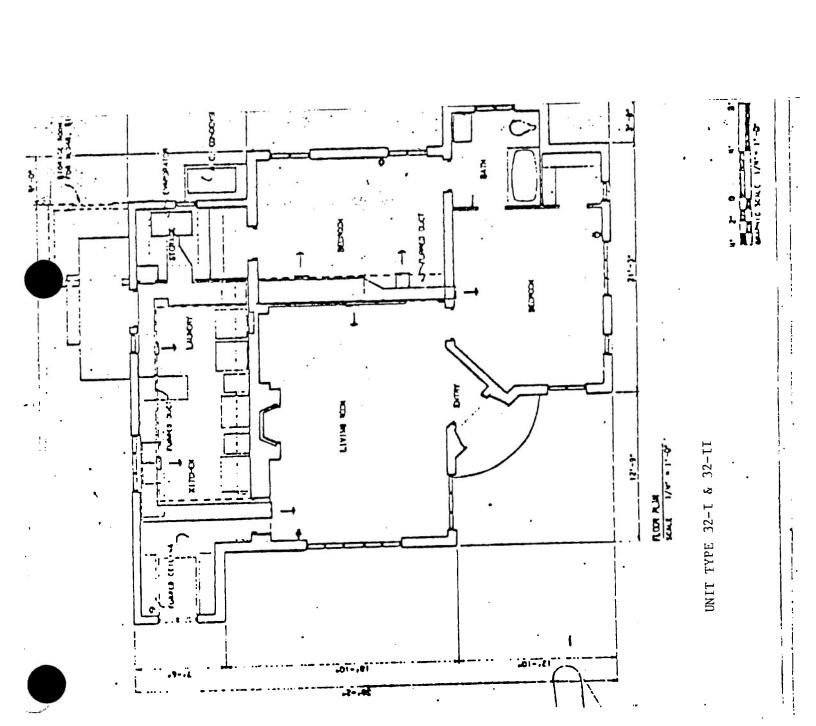


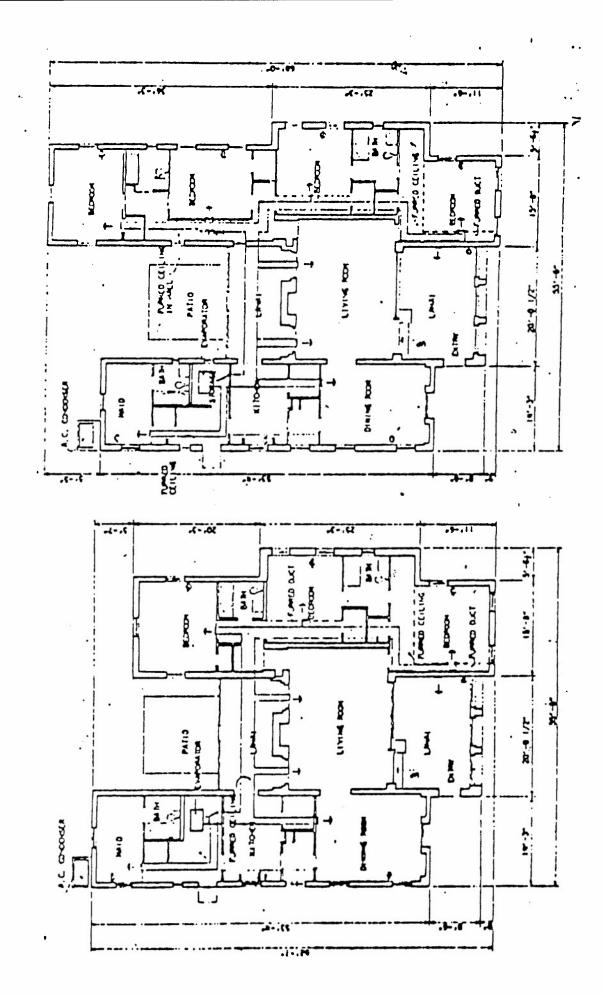
UNIT TYPE 20-IV



UNIT TYPE 20-V

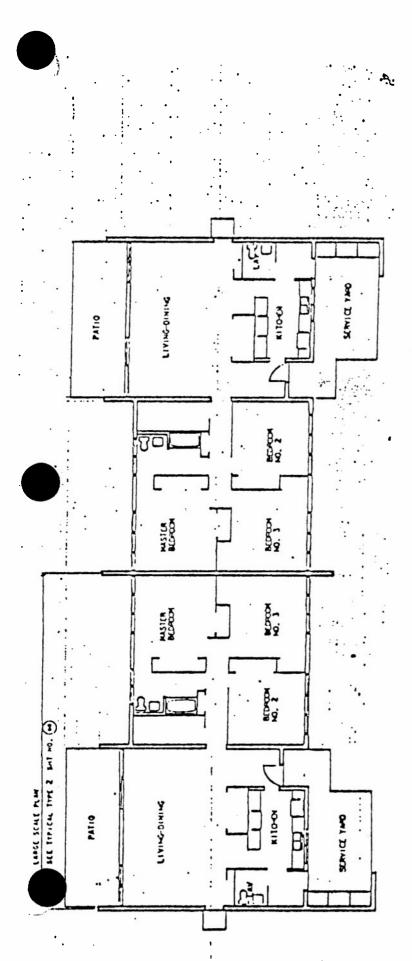
UNIT TYPE 20-VI





UNIT TYPE 57-I

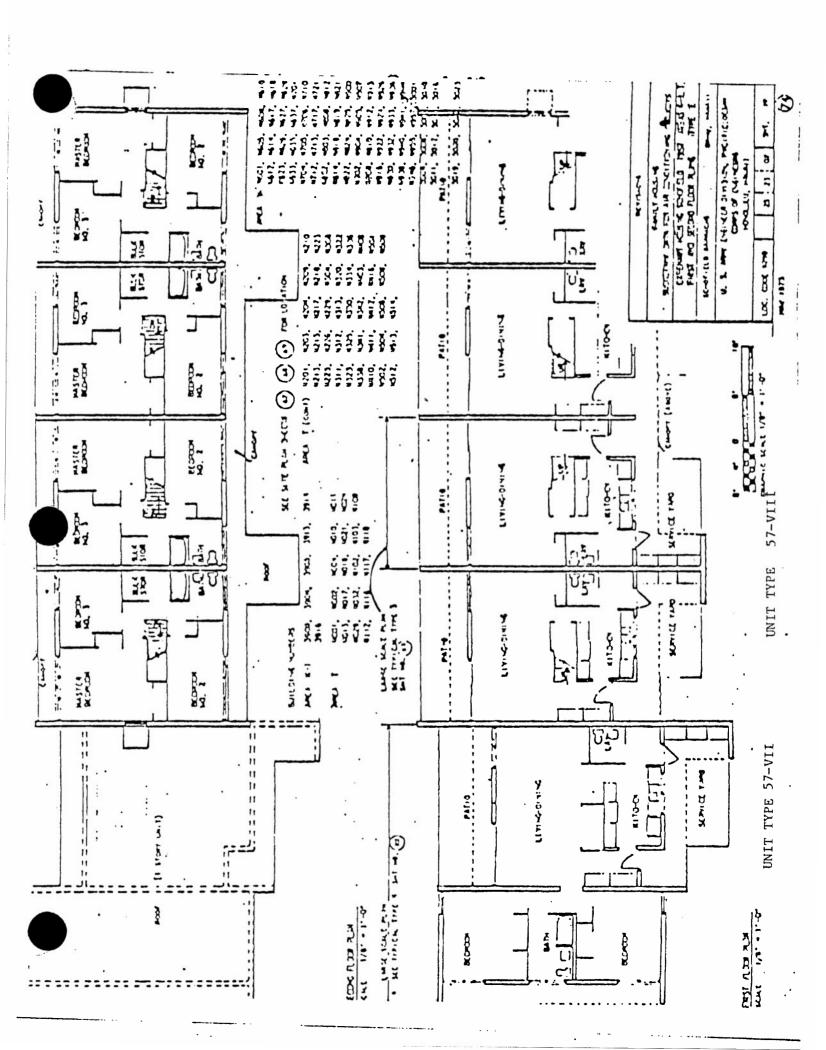
UNIT TYPE 57-11

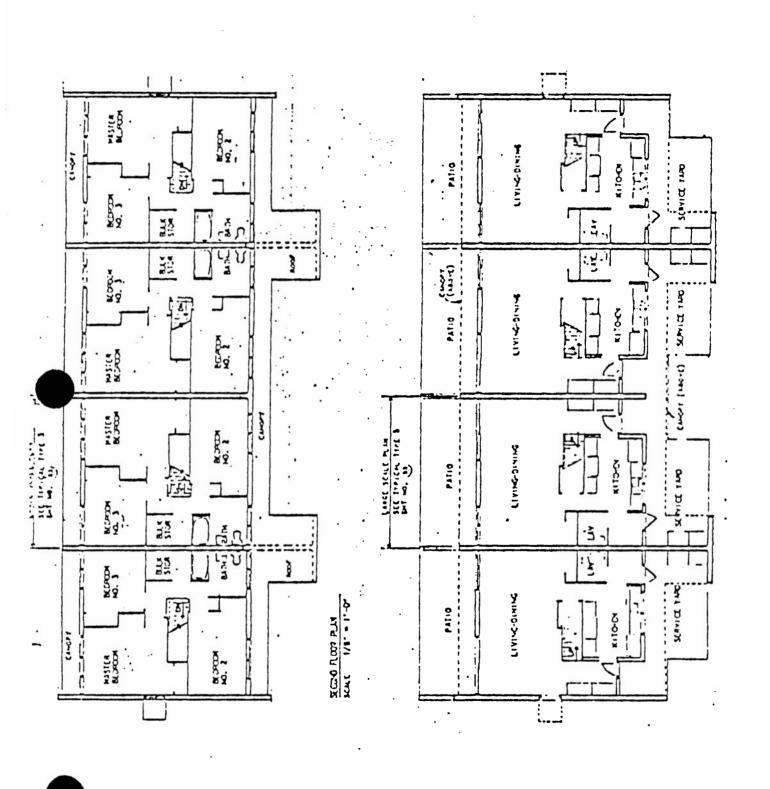


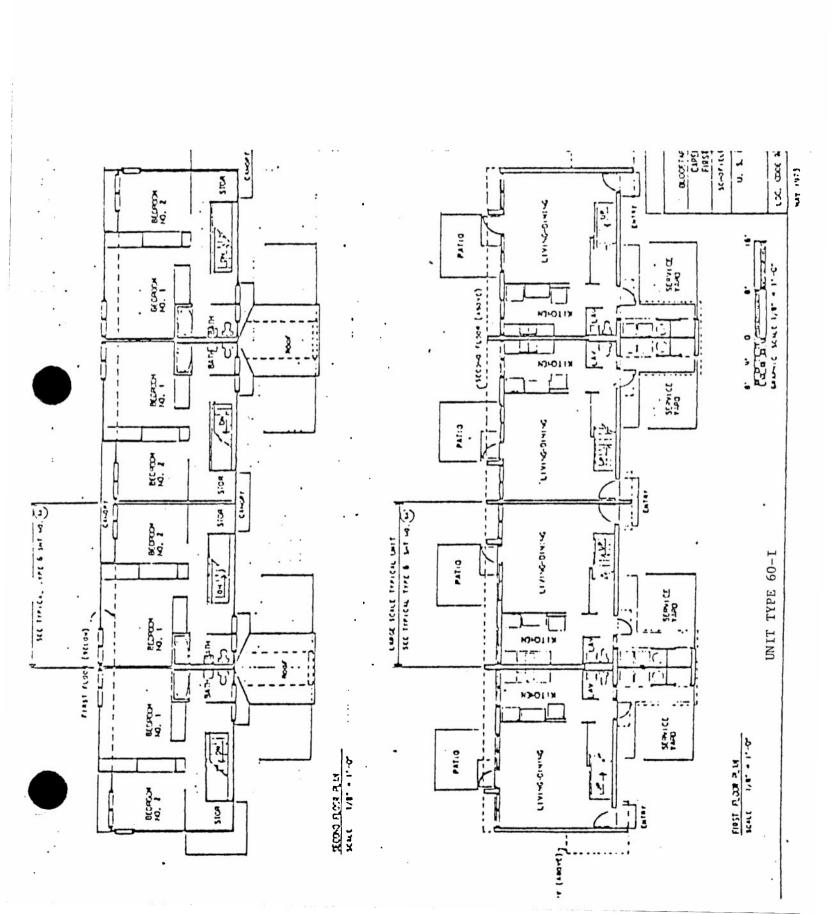
UNIT TYPE 57-III

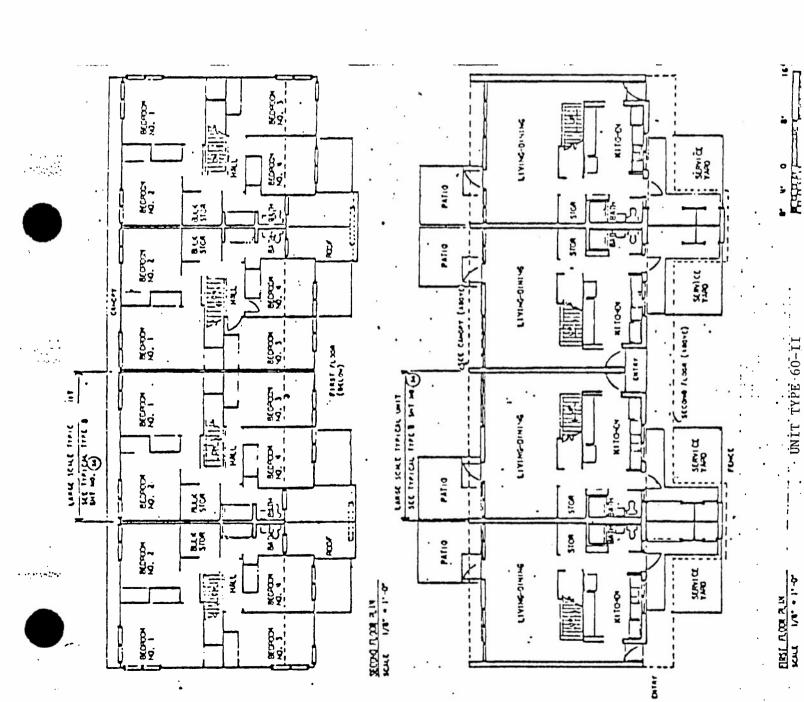
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UNIT TYPE 57-VI



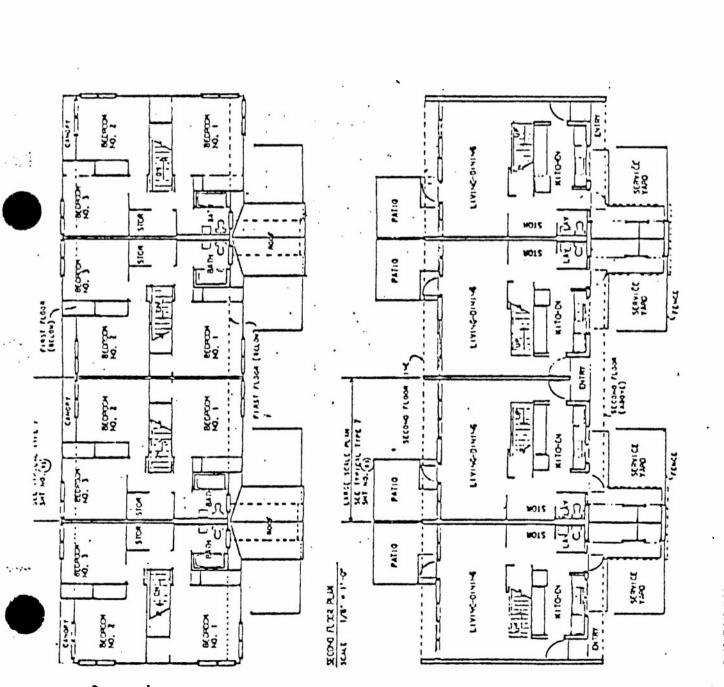






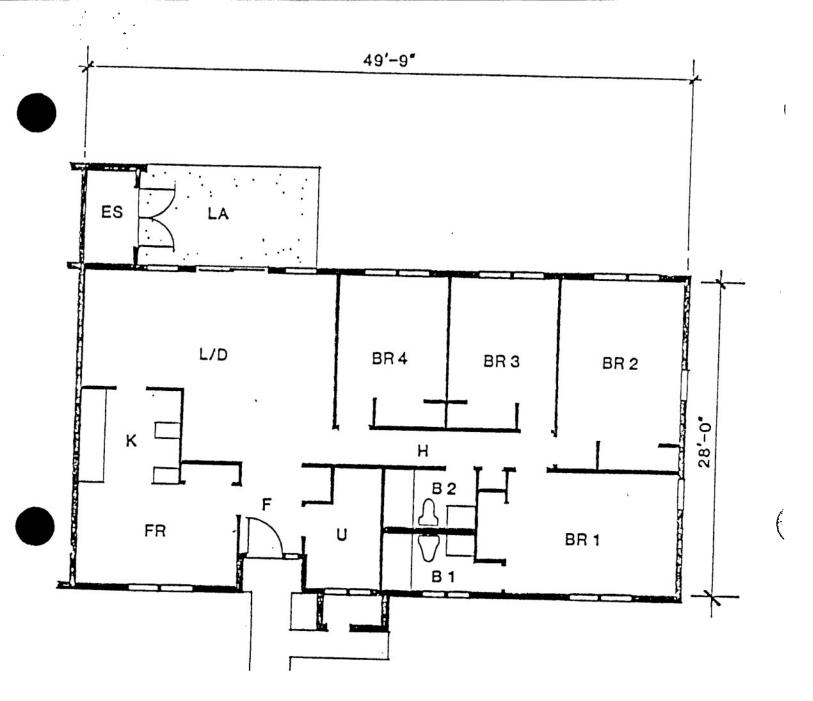
.. UNIT TYPE 60-II

SCH LAW AW



FIRST FLOOR PLIN

UNIT TYPE 60-III



UNIT TYPE 71-I

LOW COST ECO PROPOSAL

1. PROJECT TITLE

Replace Incandescent Lights

2. CURRENT SITUATION

Housing units currently have incandescent light fixtures located throughout the quarters. Incandescent lighting is less efficient than fluorescent lights, which can produce the same effective illumination with approximately 80% less electrical input.

3. PROPOSAL

Existing incandescent bulbs will be removed and new energy saving fluorescent retrofit adapters (ballast and lamp) will be installed in the fixture. Installation of the new fluorescent adapters consists of screwing the adapter base into the existing fixture.

4. PROJECTED SAVINGS

Energy savings were determined by unit type. Savings varied depending on the wattage and number of incandescent fixtures in the unit. A summary of energy savings by unit type is shown in the following table:

Unit	# of Units	X Daily Saving	X 365 Days/yr = Annual
Type	in project	per Unit	Savings
		(KWH/day)	(KWH/yr)
20-11	14	5.894	30,118
20-111	122	5.523	245,930
20-IV	29	6.885	72,878
20-V	14	4.914	25,110
32-I	11	0.270	1,084
32-II	11	0.270	1,084
32-111	26	6.504	61,728
32-IV	9	5.780	18,987
57-I	8	4.832	14,109
57 - II	68	2.220	55,100
57-III	20	1.860	13,578
57-IV	136	2.220	110,201
57-V	102	1.680	62,546
57-VI	24	2.220	19,447
57-VII	6	1.680	3,679
57-VIII	24	2.220	19,447
57-IX	16	2.220	12,965
60-I	20	0.270	1,971
60-II	16	0.270	1,577
60-111	76	0.270	7,490
71-I	5	0,360	657

Total Electrical Savings - 779,691 KWH/yr X 0.003413 MBTU/KWH - 2,661 MBTU/yr

Total Cost Savings - 779,691 KWH/yr X \$0.068/KWH - \$53,019/yr

5. <u>ESTIMATED CONSTRUCTION COSTS</u>:

Construction costs varied with the unit type and is summarized as follows:

Unit	# of Units	X	ECC	_	ECC
Type	in project		per Unit		(\$)
			(\$)		(KWH/yr)
20-II	14		835		11,690
20-III	122		805		98,210
20-IV	29		890		25,810
20-V	14		680		9,520
32-I	11		* 37		407
32-11	11		. 37		407
32-III	26		1,000		26,000
32-IV	9		945		8,505
57-I	8		645		5,160
57-II	68		370		25,160
57-III	20		260		5,200
57-IV	136		370		50,320
57-V	102		220		22,440
57-VI	24		370		8,880
57-VII	6		220		1,320
57-VIII	24		370		8,880
57-IX	16		370		5,920
60-I	20		37		740
60-II	16		37		592
60-III	76		37		2,812
71-I	5		. 37		185

Total Estimated Construction Cost = \$318,158 (see attached & above)

6. <u>SIMPLE PAYBACK</u>:

\$318,158/\$53,019 - 6.00

7. <u>SAVING TO INVESTMENT RATIO (SIR)</u>:

SIR - 1.94 (see attached)

TASK DESCRIPTION											
Loit Type 20-IL	C QUANT	TITY			ABOR		EQL	EQUIPMENT	``````````````````````````````````````	MATERIAL	
Q,	NO. OF	UNIT	MH/ MIT	TOTAL	UNIT	COST	PRICE	COST	UNIT PRICE	COST	TOTAL
9w Fluores. Adaptor	0	8A			38.20	0			8/		
					7						
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	6/		Ž	000		1,0 07			23	11-18	6 /6/
1		5		6	>	0			17	0/1	226.01
								Subto	7		629.79
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								о/н		(103.92
								- X2	4)	(%	31.87
								Bond	(1)	``	8.29
							,	TOTAL			836,34
										7.4%	\$ 835
,											
•											
										•	

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	QUANT!	TITY			ABOR		3	EQUIPMENT	¥ X	MATERIAL	
Unit Tupe 20-II	NO. OF UNITS	UNIT	TIN)	TOTAL	PRICE	COST	PRICE	COST	PRICE	COST	TOTAL
- 1		•									
94 Fluores, Adapto	a	2	0.15	1.20	28.20	45.84			8/	144	189.84
					-						
11W Fluence, Adapha	0	73	0.15	0		0			2	0	0
15W Fluence. Adapter	51	£A	0.15	2.25	\rightarrow	85.95			22	336	45.95
						•					
								SUHE	4		605.79
					٠			Profit	(10%)	(85'09
								н/о	(15%		96.96
								Tax.	(47		30.65
								Bond	761)		7.97
								Total			804.95
		-									
NoTE:										SAY \$	805
A Hat'l cust quote ul											
Pelsa lighting (524-37	(**)										
(B. bby Glamon)											
•											
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Unit Task description Will	7 7 1 T	1 + 10:17 4	970	1	3	1	ESTIMATOR		CHECKED BY	SHEET	OF	
10 ON 10 WINT WINT TOTAL DWIT COST PANCE COS	Series Deadester	OUAN OUAN	נונע			7		3	UIPMENT	X	TERIAL	
aples 2 64 0.15 0.30 58.2 11.46 18 36 47.49 Jackson 7 64 0.15 2.40 4 91.68 Jackson 7 64 0.15 2.40 4 91.68 Subtract (107) 671.0 Oby (152) 110.7 Oby (152) 1	TASK DESC	MO. OF UNITS	UNIT	#1 X-5	TOTAL	PRICE	COST	PRICE	COST	PRICE	COST	TOTAL
apler 2 64 0.15 0.30 58.24 11.46 18 36 47.49 Jackson 7 64 0.15 1.05 40.11 20 140 180.11 Idepler 16 64 0.15 2.40 4 91.68 22 352 443. Idepler 16 64 0.15 2.40 4 91.68 22 352 443. Idepler 16 64 0.15 2.40 4 91.68 6.40 (17) 6.71.2 Oly (152) 110.7 Oly (152) 110.	0											
1. 1	Fluores.	2	52	0.15	0.30	00	11.46			18	×	47.46
Japhn 7 EA 0.15 1.05 40.11 20 140 180.1 1dephn 16 EA 0.15 2.40 \$ 91.68 Subht 1 C 11.2 Prof. (107) 671.1 Off (152) 100.7 Ford (17) 33.9 (524-57 44) Subht 1 C 12 352 443.												
1 Subtraction 16 EA 0.15 2.40 & 91.68 22 352 443. Subtraction 10 EA 0.15 2.40 & 91.68	Flue HS.	7	52	0.15	1.05		11.04			2	071	180.11
16 EA O.15 2.40 4 91.68 22 352 443. 19 24 352 443. 24 252 352 443. 25 352 443. 26 21.2 27 352 443. 27 22 352 443. 27 24 (107) 67.1 28 26 24 (107) 88 26 24 (107) 29 25 352 443. 20 21.2 20 21												
5ubbb (107) (71.3) (107) (71.3) (107) (71.3) (107) (71.3) (107) (1	Flushes.	2/	£A	0.15	2.40	\rightarrow	87.16			22	5	!
Subth (107) 671. Subth (107) 671. Profit (107) 671. O/H (152) 110. Tox (47.) 33. Bead (17.) 8. (524-3744) (524-3744)							•					
5μμμμ (107) (71. Profit (107) (71. Profit (107) (71. 100												
Profit (107) 67. Profit (107) 67. O/H (157) 110. O/H (157) 110. 33. Bood (17) 891. Off. L/ C524-3144) B991. C524-3144) B991. C524-3144) B991.												671.25
$ \frac{O/\mu}{12x} (15x) 110. $ $ \frac{1}{3} \cdot \frac{1}{3$						•			7. yord	(10%	(67.13
ot ul (524-37 44) (524-37 44) (524-37 44)									н/о	(15%	(110.76
bend (1π) 8. Total 891. ot. ωl (524-57 Ψμ)										(47		33.97
ot. ω/ ot. ω/ (524-37 44) β91.9 (524-37 44) β91.9 (524-37 44)									Bond	(1%		8.83
ot. ω/ ot. ω/ (524-37 Ψμ) β, (524-37 Ψμ) β, (524-37 Ψμ) β, (624-37 Ψμ)												
ot. ω/ (524-37 44)									Total			2
0 th ω/ (5 2 φ- 57 ψμ) λ)			٠									
$\frac{f}{f} \frac{\omega l}{(524-37)} \frac{\omega l}{44}$	<i>'</i> 07€ :										544	4840
(524-37/44)	Hat'I				,						١	
	c Liablica (
	(Bobby Gloman)										_	
)											
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	1	1:10	1			ESTIMATOR	CHE	CHECKED BY	SHEET	OF	
Nelad Incades and	OUANI OUANI	LITY			ABOR		0	EQUIPMENT	73	MATERIAL	
TASK DESCRIPTION	NO. OF UNITS	UNIT	FIET STATE OF THE	TOTAL	UNIT	COST	PRICE	COST	UNIT	COST	TOTAL
100											
9w Fluores. Adapton	7	73	0.15	05.0	38.2	11.64			81	36	47.64
•	,		1	9							
11W Fluens Adepha	e	\$	0.15	0.4		34.38			2	120	154.38
ī	2	7.7	Z.	α	-	1/2 7/			0,	240	300 7/
15 W + 1 wo Hes. + 1 ownto	1	23	•	2	>				11		•
								उपमार	9		510.78
									(107		51.08
								0/н	(15%		84.28
			_				•	Tax .	(47.	(25.85
								Bond	(1%	(6.72
								Total			678.70
					·						
NoTE:										SAY #	080
) Hat'l cost quote ul										١	
Lighting (524-37	(74										
(Bibby Glamas)											
•											
DA FORM 5418-R, Apr 85 CONTD											

75		TOTAL					27.73			27.73	2.77	4.58	1.40	98.0	36.85		37.00							
OF	KAFERIAL	COST					22))			5AY #							
SHEET	KX	PRICE		8/		3	 22			9	(10%	(15%	(+1	(19,										
CHECKED BY	EQUIPMENT	COST								744.2	Profit	н/о	Tox Y	Bond	Total									
E. F.	02	PRICE													925									
ESTIMATOR		COST		٥		0	5.73	•		:										•				
	ABOR	PRICE		28.2			\				٠					·								
		TOTAL					0.15																	
		TINS.		0.15		0.15	0.15		·															
2	1117	UNIT		23	·	ঐ	 £A																	
alts	QUANT	MO. OF UNITS		0		0	1												(* *					
PR Keplace Incadescent Lia		CRIPTION 32-I 4 II	5	94 Fluencs. Adapter		11W Fluence. Adapha	15W Flustes. Adaple										NOTE:	A Hat'l cost quote ul	Liebfica (524-37	(Boleby Gland))	•		

8		TOTAL				283.03	471.41		754.44	15.44	124.48	38.17	9.93	1002.47		000/								
OF	KATERIAL	COST				220	374))	(SAY \$)							
SHEET	K	PRICE		18		2	22		1	(107	(152	(47.	(19											
CHECKED BY	EQUIPMENT	COST							SILLE	4	н/о	Tax	Band	Total								•		
CHE	Č	PRICE																						
EST!MATOR		COST		0		63.03	14.79	•																
	BOR	PRICE		28.2			- >			•					·									
		TOTAL				1.65	2.55																	
		THE SECOND		0.15		51.0	0.15																	
	11TY	UNIT		52	٠	54	£A																	
10/15	QUANTI	NO. OF UNITS		0		11	17											(74)						
PRC Krelage Incadescent Li		Mail Tune 32 - III	0	9w Fluores, Adaples		11W Fluence. Adapha	15W Fluence. Adapte									NoTE:	A Hat'l cust quote ul	2 Liebfica (524-37	(Bobby Gland))	•		•	

Tax obsention More last More	7 - 7 -	1 - 1 - 1 - 1 - 1	070	'			ESTIMATOR	3	CHECKED BY	SHEET	OF	[5]
Marie Wart Will Will Will Will Cost Will Cost Will Cost Will	200	O OUAN	TITY			ABOR		03	UIPHENT	ķ	ITERIAL	
aples 0 64 015 5822 0 18 Jacha 21 5A 0.15 3.15 \ 120.33 \ 22 462 582. Jacha 21 5A 0.15 3.15 \ 120.33 \ 22 462 582. Jacha 21 5A 0.15 3.15 \ 100.19 \ 117. Jacha 21 5A 0.15 3.15 \ 100.19 \ 117. Jacha 21 5A 0.15 3.15 \ 100.19 \ 117. Jacha 21 5A 0.15 3.15 \ 100.19 \ 117. Jacha 21 5A 0.15 3.15 \ 100.19 \ 117. Jacha 21 5A 0.15 3.15 \ 100.19 \ 117. Jacha 35.9 Jacha 31.40 Jacha 36.9 Jacha 36.9 Jacha 40.9 J	TASK DESCRIPT	MO. OF UNITS	UNIT	H. H.	TOTAL	PRICE	COST	PRICE	COST	PRICE	COST	TOTAL
1 28.65 18 18 19 19 19 19 19 19	10											
Jacks 28.65 20 100 128.	Fluores.	0	23	0.15			0			8/	·	
Japhn 5 Ex 0.15 0.75 28.65 20 100 128.6 Japhn 21 Ex 0.15 3.15 4 120.33 22 462 582. Subth 1 (107) 71.1 Prof. (107) 71.1 O/H (157) 117.3 St. 4 Subth 2 (107) 71.1 O/H (157) 117.3 St. 4 St. 4 Subth 3 St. 4 Subth 4 St. 5 Subth 4 St. 6 Subth 6 (107) 71.1 Subth 6 (107) 71.1 Subth 7 St. 6 Subth 6 (107) 71.1 Subth 7 St. 6 Subth 6 (107) 71.1 Subth 7 St. 6 Subth 6 (107) 71.1 Subth 7 St. 6 Subth 7 St. 6 Subth 6 St. 6 Subth 6 St. 7 Subth 7 St. 7 Subth 8 St. 7 Subth 7	•											
1 (42 582. 4 120.33 22 462 582. 462 582	Flus HS.	5	73	0.15	27.0		28.65			2	/00/	8
1 EA 0.15 3.15 y 120.33 22 462 582. Subt to 17.3 Tax (47.1) 35.9 10.1 11.2 12.4(2.2.582.) 11.7 11.3 12.4(2.2.582.) 11.7 12.4(2.2.582.) 11.7 13.4 14.7 14.7 15.4 16.4 17.8 18.6 1		į		- 1	1							
24 100 100 100 100 100 100 100 100 100 10	Flue Hes.	77	£4	- 1	3.15	>	0.3			22	462	7
24 LA E (107) 71. People (107) 71. O/H (157) 117. Tax (471) 35. 8 20.d (171) 9.3 10. (524-37) 44) Strip (524-37) 44)							•					
2. LAP (102) 710. Profit (102) 711. O/H (152) 117. Tax (471) 35. Bond (171) 9.3 1. (524-37) 44) Style (524-37) 44)												
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									廿	,		- 1
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						٠			Profit	(10%)	71.10
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$									н/о	(15%)	117.31
2th w/ Say 4 945.										(47.		35.98
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									Bond	(19		9.35
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$												
= at'l cust quote ul selsa liabtica (524-37) 44) (Bobby deland)												44.
2t w/ SAY # 945.			•									
5t w/ (524-37 44)											!!	45.
(524-37 44)	Hat'l cust quot											
	a Ciablica	(**										
	(Bobby Gland)						•					
	7											
	٠											
									•		•	

OF	HAL	COST TO TAL				11.081 071	242 305.03	*1		485.14	15.87	80.05	24.55	6.38	644.63		SAY \$ 645	,						
SHEET	T KATERIAL	PRIC		8/		2	22 2			7 ने १	(107)	\vdash	(42)		8		\$							
CHECKED BY	EQUIPMENT	UNIT COST								H7S	Prof.	н/о	Tax	Bond	Total									
EST!MATOR		COST COST		0 7		40.11	63.03	•																
00	BOR	TOTAL		0 38.2		1.05	1.65		•															
. LD .	17.4	UNIT WHY	•	EA 0.15	-	SA 0.15	54 O.15									·								
17 + 10 17 H	QUANTI	NO. OF		0		7	11		i										51 44)					
KA16 . 421		TASK DESCRIPTION	0	9w Fluers. Adapton		11W Fluence. Adopha	15W Fluence. Adapte										NOTE:	a) Hat'l cost quote ul	Liebfica (524-	(Bobby Gland)		٠	•	

		TOTAL				2 77.30		277.30	27.73	45.75	14.03	3.65	368.46	\$ 370.00							-	
PO	MATERIAL	COST				220			(((544	١.					•		
SHEET	3	UNIT PRICE		18	2	22		7	(107	(15%	(47.	(19										
CHECKED BY	EQUIPMENT	COST						THIS	Profit	н/о	Tax	Bond	Total							•		
CHE	2	PRICE											·									
ESTIMATOR		COST				57.30	•										•					
	ABOR	PRICE		58.2		\rightarrow			·													
?	1	TOTAL HRS				1.5																
		FINAL PRINCE		0.15	0.15	0.15																
07./	TITY	UNIT	•	23	£4	£A																
1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1	QUANT	NO. OF UNITS	H	0	ဝ	0/										(*						
PR Role of Street Color		LANT TUNE 57-TT ST-TT	72, III -12, II -12	9w Fluores, Adapton	11W Flue HS. Adaph	15W Fluence. Adentes								NOTE:	I Hat'l cost quote ul	2 Liebfica (524-37	(Bobby Glaman))	•		•	

		TOTAL					194.11		1194.11	14.41	32.03	9.82	2.55	257.92	\$260.00							
OF.	ATERIAL	COST					hs1			()	((4×5	١						
SHEET	ž	PRICE		18		20	22		1	(107	(15%	(47.	(1%									
CHECKED BY	EQUIPMENT	COST							37H4	Profit	н/о	Tax.	Bend	Total						•		
S. H.	60	PRICE												·								
ESTIMATOR		COST					40.11	•										-				
	ABOR	PRICE		28.2			\rightarrow			•												
?		TOTAL HRS		0		Ø	7.05					2 252										
1		LIZ EX		0.15		0.15	0.15															
1000	1117	UNIT		2	-	\$	£A															
1 + 10.17. F	QUANT	MO. OF UNITS		0		0	7										(74					
KA16 .	The state of the s	ILM: TANDESCRIPTION	0	9w Flucks. Adapto		IIW Fluenc Adopte	15W Flustes. Adepter								No7E:	> Hat'l cust ouct ul	(10 1 fice (524-37	of lamps)				

TASK DESCRIPTION TASK DESCRIPTION TASK DESCRIPTION TASK DESCRIPTION	QUANTI	117			ABOR							
TUDE 57. I 9 VII							Š	ROUPERNI	_	KALERIAL	- Comp	
7,00	NO. OF UNITS	UNIT	FIX	TOTAL	PRICE	COST	PRICE	COST	UNIT	COST	TOTAL	
9w Flucks, Adapta	0	2	0.15		28.2				18	·		
IIW Fluens Adora	0	\$	0.15						2			
15W Fluence. Adap	9	£A	0.15	0.30	\rightarrow	34.38			22	132	88.99/	
						٠						
								3745	9		166.38	
					•			Prof.t	(107		16.64	
								н/о	(15%		27.45	
						e.		. X&	(47)		8.42	
								Band	(1%		2.19	
							·	Total			221.08	
		·										
NoTE:										SAY	\$220	
Hat'l cust ough ul										h		
19:0 (524-37	(**											
(Bobby Glamas)												
D												
•												
								•				
					,							

	Ja .			T	·	.73			27.73	2.77	4.06	1	0.36	1	36.82		37.00										
0F	COST TOTAL					27.			27		7		1		3		SAY										
SHEET	UHIT COS		8/		2	1	777		7	\rightarrow	(15%	. (47.	d (1%		7 8							-		-	-		
CHECKED BY	2	PRICE							H'5	Profit	H/0	Tax	Bone		Tota					+	1		1		1	-	
ESTIMATOR	H	COST					5.73										-		-								
	BOR	TOTAL UNIT		28.2			0.15		•	1			-	-	 	1	+										
1	-	TIME SA	1_	EA 0.15	_	5A 0.15	54 O.15							-	1		•				-				-		+
	Lights OLANTITY	NO. OF	_	0		0	-												1								
	FRE Replace Incadescent	TASK DESC	Unit Type 60-I		a .	11W Fluens Adapta		15W Flustes. Adopto										1	4000	Pelca Lightica (527=	(Bobby Glanson)			•		3-5	DA FCRM 5418-R, Apr 85 CONTD

RATE: ¥21	31 + 10	7.18	" "	ν. 1 α	1	ESTIMATOR	CHE	CHECKED BY	SHEET	Q.		
المادة المادة المادة المادة المادة المادة المادة المادة المادة المادة المادة المادة المادة المادة المادة المادة	QUANT	711			BOR		201	EQUIPMENT	3	MATERIAL		_
TASK DESCRIPTION	MO. OF UNITS	UNIT	H. E.	TOTAL	UNIT	COST	PRICE	COST	PRICE	COST	TOTAL	
0												
94 Fluores, Adapto	0	22	0.15		38.2				8/			
		·				,						
11W Flus HS. Adapha	0	£4	0.15						3			
15W Flustes. Adapta	/	£A	0.15	0.15	→	5.73			22	22	27.73	
						•						
				-								
								THY IS	3		27.73	
								Profit	(107	(2.77	
								н/о	(15%)	4.56	
								Tox.	(42	(1.40	
								Bond	(19,		0.36	
								Total			36.82	
NOTE:										SAY	\$37.00	
a) Hat'l cost ough ul										•		
Liebfica (524-37	(74)											
(B.bby Glomas)						•						
>												
•												
								•		•		
			. · · · · · -									
DA FORM 5418-R, Apr 85 CONTO												

0.15 0.15 \$5.73	MO OF UNIT WH WEAS OO CA
TOTAL UNIT COS HAS PRICE 28.24	
38.2	
38.2	
0.15 \$ 5.7	
0.15	
0.15 \$ 5.7	
0.15 4 5.7	
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LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCA	ATION: Schofield Barracka REGION NO. PROJECT NUMBER
PROJ	JECT TITLE Replace Incadescent Lights FISCAL YEAR
	CRETE PORTION NAME
ANAL	YSIS DATE 12/21/90 ECONOMIC LIFE 25 YEARS PREPARED BY #
١.	INVESTMENT COSTS A. CONSTRUCTION COST B. SIGH (5.5%) C. DESIGN COST (10%) D. ENERGY CREDIT CALC (1A+1B+1C)X.9 E. SALVAGE VALUE OF EXISTING EQUIPMENT F. TOTAL INVESTMENT (10-1E) \$ 318,158 1 17,449 5 31,876 5 330,726
2.	ENERGY SAYINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT COST \$ DISCOUNTED SAVINGS
	COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
	A. ELEC \$ 19.94 2.661 \$ 53,060 12.12 \$ 643,091 B. DIST \$
	F. TOTAL \$ 53,060 \$ 643,091
3.	NON ENERGY SAVINGS (+) / COST (-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE 1) (2) DISCOUNTED SAVING/COST (3A X 3A1) \$ 0
	B. NON RECURRING SAVINGS (+) / COST (-) ITEM SAVINGS \$ (+) YEAR OF DISCOUNT DISCOUNTED SAV- COST \$ (-)(1) DCCURRENCE(2) FACTOR (3) INGS (+) COST(-)(4)
	a \$
	C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) / COST (-) (3A2+3Bo4) \$ 0
	D. PROJECT NON ENERGY QUALIFICATION TEST (1) 25% MAX NON ENERGY CALC (2FS X .33) a. 1F 3D1 IS = OR 3C GO TO ITEM 4 b. 1F 3D1 IS 3C CALC SIR = (2F5+3D1) : 1F = c. 1F 3D1b IS = 1 GO TO ITEM 4 d. 1F 3D1b IS 3 PROJECT DOES NOT QUALIFY
4.	FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d : YEARS ECONOMIC LIFE) \$ 53,060
۶.	TOTAL NET DISCOUNTED SAVINGS (2F5+3C) \$ 643,091
6.	SIR (IF I PROJECT DOES NOT QUALIFY) (SIR)=(5: 1F)= /, 94